ARAB ABD CHINESE NAVIGATORS IN MALAYSIAN WATERS IN ABOUT A.D. 1500
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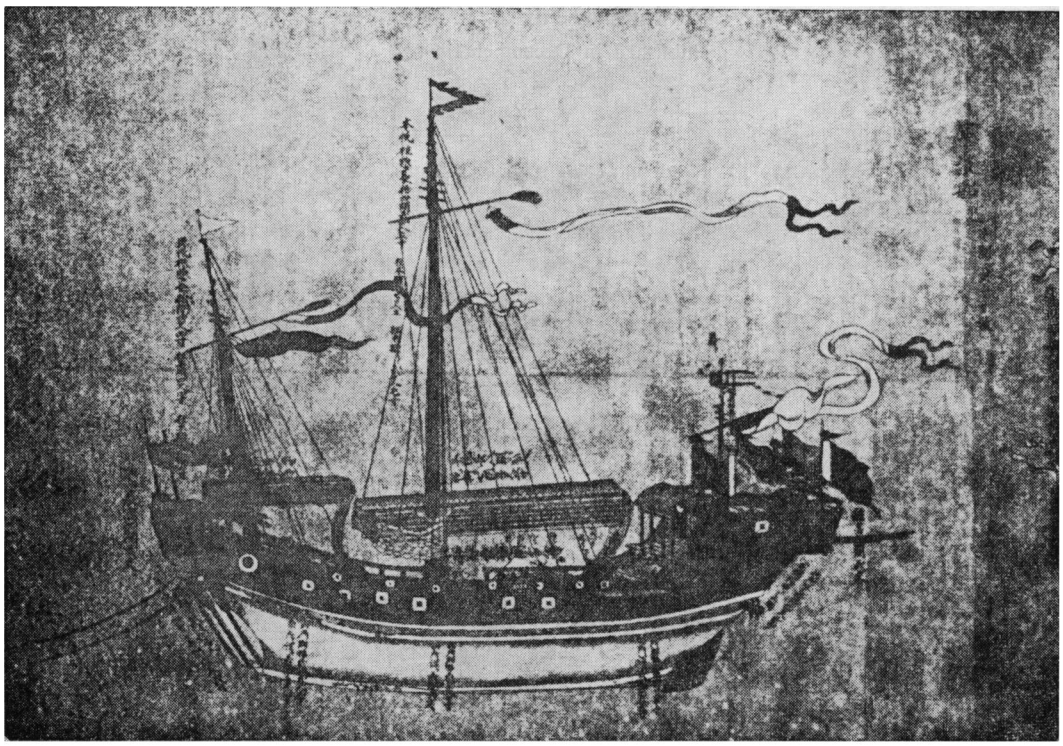

Plate 1. Painting of a Chinese Junk. One of thirteen paintings of Chinese junks in a scroll discovered by Captain Ian MacRobert in the National Gallery of Victoria at Melbourne. The original was probably painted in about A.D. 1700.
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ARAB AND CHINESE NAVIGATORS IN MALAYSIAN WATERS IN ABOUT A.D. 1500

by
J. V. MILLS

SCOPE OF THE ENQUIRY.

To set out the sailing instructions contained in the Arab and Chinese texts, to identify the places named, and to add appropriate comments. Also, to enquire whether the Arab or Chinese texts, respectively, elucidate difficulties presented by the others.

We select the date 'about A.D. 1500' because it is approximately the period at which

(a) the information on nautical matters contained in the Arab and Chinese texts, and

(b) the information on maritime activity contained in the Portuguese books of the early sixteenth century,[1] can be compared.

The main importance of the sailing instructions lies in the facts that, first, they show the method whereby merchant ships could be guided safely from one sea-port to another, and secondly, (except for the Mao K'un map) they indicate the tracks of the principal trade-routes.

EXPLANATIONS.

(1) Nomenclature. The names of countries are in accordance with English conventional usage; for instance, China.

The names of administrative divisions and places are those adopted by the supreme authority of the state in which they lie; for instance, Melaka (Malacca).[2]

For the spelling of Malay place-names we have consulted the maps of 1971 and 1973 published by the Directorate of National Mapping, Malaysia, and The Atlas of South-East Asia (1964) published by Macmillan & Co., as well as the 'Pilots' and Charts published by the Hydrographic Department of the Admiralty: but these authorities are not entirely consistent: moreover, it is uncertain how far the spelling of place-names will be affected by the new system of romanized spelling adopted by the Governments of Malaysia and Indonesia in 1973: thus, since the spelling has not been stabilized, we have to make a choice, and in cases where a doubt may arise, we have added an alternative place-name in brackets where the names first occur.

It is worth noting that the Arabs normally — perhaps always — transliterated the Malay names of places; thus, the Malay 'Angsa' is rendered as 'Hansa'. The Chinese, on the other hand, might denote a place in one of three ways; (a) they might transliterate the Malay name; thus, the Malay 'Melaka (Malacca)' is rendered as 'Man-la-chia'; (b) they might translate the Malay

name; thus, the Malay 'Pulau Sembilan' is designated 'Chiu chou (Nine islets)'; (c) they might coin a purely Chinese name; thus, Pulau Tinggi is designated 'Chiang chun mao ('General's Hat')'. A note on Malay place-names will be found in Addendum D.

(2) Bearings. When the figures given in the texts appear to be incorrect or deficient, it seems reasonable to presume (a) that the authors obtained the best information available at the time, (b) that the figures were approximately accurate under the conditions then prevailing, and (c) that navigators were expected to use, and did use, their common sense, in making a correction when they found they were off their course.

When the texts differ, we have to make a selection.

We have not attempted to 'correct' the figures, since they might be affected by several variable factors, especially variation of the compass (about 5°), currents, and winds. To attempt a 'correction' requires the knowledge of a nautical expert.

In order to facilitate comparisons, we have specified a 'reasonable' course, and measured distances along it[3]. This course ordinarily runs, in the open sea about 5 miles from the capes, and in confined waters along the middle of the fairway. Measurements are made between points where a land-mark is brought abeam.

For convenience, instead of writing '*kuei ch'ou*' or '15° – 30°', we write '22½°', and so on.

In Chinese texts it often happens that after the primary bearing has been given, subsequent changes of course are omitted.

In this paper a sailing direction is not considered 'adequate' unless it states both (a) the course to be steered, and (b) either the distance to, or the time taken in reaching, the nearest appropriate land-mark.

(3) Stellar altitudes. In the Tables of this paper, a factor of 3°30′ has been added to the equivalent of the Arab stellar altitudes in order to compensate for the difference in distance of the Pole Star from the Pole.

(4) Measurements. We retain the British nautical mile, being one minute of latitude, with 6080 feet (the approximate value at latitude 48°) as the standard value. The linear value of one degree is approximately 69 statute miles or 111 kilometres. The degree is sub-divided at the bottom left-hand corner of the maps accompanying this paper. We also retain the fathom of 6 feet.

(5) Transliteration. Chinese words are transliterated according to H. A. Giles, *A Chinese-English Dictionary*, subject to the qualification that *chüeh*, *ch'üeh*, *hsüeh*,*yüeh*, and *i* are written, respectively, for *chio*,*ch'io*,*hsio*,*yo*, and *yi*.

Arabic words are transliterated according to G. R. Tibbetts, *Arab Navigation;* but it may be pointed out that Tibbetts' renderings are not always orthodox; thus, the Malay word *pulau*, 'island', is rendered 'pulau' by Tibbetts, whereas the first letter is usually taken to have the sound of *f*, and Ferrand writes 'fulo'.[4]

(6) Superior numbers in ordinary type refer to the notes appearing after the section headed 'Conclusions' in this paper. Superior numbers in italic type and superior numbers in italic type surrounded by a bracket refer to the Arabic letters and Chinese characters, respectively, appearing at the end of this paper. The corresponding place-names will be found in Tables I, II, IV, VI, VIII, and X.

(7) The present writer should add that he has not studied Arabic or navigation, and he therefore claims the reader's indulgence if he has erred in these two fields.

SOURCES.

Arab.

(a) Shihab al-Din Ahmad bin Majid (hereafter called Ahmad), an Arab of Julfar, boasted of being a *mu'allim* or 'master of navigation'.[5] For the benefit of later navigators he wrote over 40 works, mostly in verse of inferior quality.

His earliest work, which may be called *Hawiya*, is a long poem dated 1462, giving 'a complete conspectus of navigational theory'; it includes routes ('roteiros') across and around the coasts of the Indian Ocean, longitudinal distances across the Ocean, and the altitudes of certain stars at ports on the shores of the Ocean.

His long prose work, which may be called *Fawa'id*, finished in 1490, is 'a kind of encyclopaedia of navigation'. *Inter alia*, he states the altitude of the Calves (Beta and Gamma of Ursa Minor) at various places along the coast from Burma to Sumatra, and gives sailing instructions for the route from the Butang islands to Melaka.

These important works are marred by many errors; scribal mistakes abound; other serious inaccuracies include the confusion of Sumatra with Sri Lanka (Ceylon), and the incorrect orientation of Java from north to south.

Ahmad must have travelled to Melaka; but he probably did not go further, since after Melaka the quality of the descriptions deteriorates suddenly.

The *Fawa'id* has been translated in the outstanding book of G. R. Tibbetts, *Arab Navigation.*

(b) Sulaiman bin Ahmad (hereafter called Sulaiman) an Arab of Shihr, being also a *mu'allim*, wrote 5 works.[6]

His first book, which may be called *Umda*, dates from 1511 and is a prose treatise on the navigator's science.

In it he described all the shores of the Indian Ocean, adding compass bearings when the navigator followed the coast; he listed the altitudes of the Pole Star at salient points on the coasts; also he gave sailing instructions for a number of particular voyages, including voyages along the west and east coasts of the Malay Peninsula; and he also treated of the route along the coast of Borneo. In a subsequent book, which may be called *Minhaj*, Sulaiman set out a new and more correct list of compass bearings and stellar altitudes for the coasts of the Indian Ocean, and gave more details concerning the longitudinal distances across the Ocean.

A later work, which may be called *Tuhfat*, contained a concise account of navigational theory.

Sulaiman made the same mistake as Ahmad regarding the orientation of Java.[7]

(c) Sidi Ali Selebi (hereafter called Sidi Ali), of Constantinople, shipwrecked commander of the Turkish Indian Ocean fleet, in 1554 produced a Turkish book on Indian Ocean navigation, called *al-Muhit*, 'The Ocean'.[8]

For the most part, the book contains a translation of Sulaiman's *Umda*, with quotations from other works of Ahmad and Sulaiman; to which Sidi Ali adds some comments of his own.[9]

In his first chapter, Sidi Ali writes an original section on the instruments used

for measuring stellar altitudes.[10]

In his fourth chapter, reproducing Sulaiman's *Umda*, Sidi Ali describes certain coastal voyages, mentioning 'Butang island', 'Fulo Pasalar' [Bukit Jugra],[11] and 'Bornay islands'.[12]

In his seventh chapter, Sidi Ali has an interesting section on the compilation of maps and charts, which are not mentioned in the earlier Arab texts.[13]

In his ninth chapter Sidi Ali gives extremely detailed itineraries of thirty voyages, including one from Diu to Melaka (27th voyage) and one from Melaka to Aden (29th voyage).[14]

Sidi Ali provides a useful tabular statement of stellar altitudes, very important in Arab navigation.[15]

Sidi Ali, like Ahmad and Sulaiman, wrongly orientates Java from north to south; also, he omits Calicut from his table of stellar altitudes.

Chinese.

(d) The Mao K'un map. This MS cartogram was reproduced in the book of Mao Yüan-I, *Wu Pei Chih*, 'Records of Military Preparations' (1621). It is usually considered to record the tracks of Chêng Ho's voyages, and may provisionally be regarded as referring to a time 'about 1422'.[16] It may be described as a patchwork of maplets, each having its own orientation and scale; it specifies the courses to be followed, the principal land-marks, the time taken in sailing between them, most of the points along the coasts, and other matters which could be of importance to sailors, on the voyages from China to Iran (Persia), Arabia, and East Africa.

Being anonymous, it was probably prepared in an official drawing office. Such maps were provided to the commanders of ships in Chêng Ho's fleets.

The furthest points shown are:—

in the north, Nan Ching [Nanking], and Hormuz,

in the east, the Pescadores islands, Tanjong Datu in western Borneo, and the east coast of Java,

in the south, the south coast of Java, and Ma-lin-ti [probably Mozambique] in east Africa,

in the west, the east coast of Africa, and Luhaiya in the Red Sea.

The map does not show the Ryu-kyu islands, or Japan; nor does it show any part of Borneo east of Tanjong Datu.

It records a number of stellar altitudes, and sometimes these provide very useful information, but some are patently incorrect, and none refers to places further east than Cochin in India.[17]

The map contains a number of errors.

This is the only one of the Chinese texts which mentions place-names on the Malay Peninsula north of Mien hua hsü, 'Cotton island' [Bukit Jugra].

It would be unsafe to conclude that Chinese trading ships visited all the places named in the map, or followed all the tracks here shown.[18]

(e) 'Shun Fêng Hsiang Sung', 'Fair Winds for Escort' (hereafter called 'Shun Fêng'). This MS nautical compendium rests in the Bodleian Library at Oxford.[19]

Probably written about 1620, it refers to conditions in about 1430.[20]

(i) It treats of navigational theory and practice, including mnemonics and prayers;

(ii) It gives notes on individual places along the sea-routes; in 'Malayan' waters, these places range from Pulau Tioman through Singapore strait (Selat Singapura) to Bukit Jugra, from the Karimun islands to the Water islands off Melaka, and from Pulau Tenggol (Tunggal) to Kuala Pahang; in 'Bornean' waters, no places east of Tanjong Datu are mentioned in these notes;

(iii) It includes special directions for entering the mouth of the Mekong river, and also for proceeding between certain places in Japan;

(iv) It contains detailed sailing instructions for one hundred particular voyages. The furthest points mentioned are:—

on the north, Japan, and Hormuz,

on the east, Japan, Ryu-kyu islands, Formosa, Philippine islands, Borneo, and Timor,

on the south, Timor,

on the west, Aden.

It lacks any reference to the Moluccas in the east, or to Africa or the Red Sea in the west, or to any place in the Malay Peninsula north of Bukit Jugra.

The book contains instructions for navigating along the coast of the Malay Peninsula between Kelantan and Bukit Jugra,[21] and along the coast of Borneo between Tanjong Datu and Pulau Balambangan.[22]

It records certain stellar altitudes, but none further east than Pulo Weh in 95° 13′ E.[23]

It contains some errors.[24]

(f) Lü P'an and Lu Ch'êng-Ên (hereafter referred to as Lü P'an). These writers compiled a work called *Ping Ch'ien*, 'A Military Manual', of which the seventh and last fascicule bears the title *Chih Nan Chêng Fa*, 'The Correct Use of the Compass'.

The earliest preface is dated 1669, and the contents of the book refer to conditions not later than about 1607.[25]

This MS work may be found in the Bodleian Library at Oxford.[26] The contents consist, to some extent at least, of copies from earlier documents.

The dates given for recorded voyages indicate that they may probably be referred to the period 1471—1588.[27]

The plan of the work for the most part agrees with that of 'Shun Fêng'.

(i) It treats of navigational theory and practice.

Four points may be noted:—

(a) It contains a sketch of the mariner's compass with 24 points.[28]

(b) It provides a table specifying the points at which 9 asterisms rose and set.[29]

(c) It mentions the 'floating log' method of calculating speed.[30]

(d) It gives the theoretical equation according to which a watch of 2½ hours is reckoned as the equivalent of "about" 60 *li* [about 20.8 miles].[31]

(ii) It contains notes on individual places on the sea-route from Liu chia ao [near Shang Hai] to the Gulf of Thailand.[32]

(iii) It sets out a table naming many pairs of near-by places and stating the

bearing from the first place to the second; in 13 cases it also states the bearing in the reverse direction from the second place to the first; in 6 of such cases the characters representing contiguous points on the compass are written in both a clockwise and an anti-clockwise direction, thus proving that, whatever the direction, the intended bearing lies half-way between the named contiguous points.[33]

(iv) It gives detailed sailing instructions for 53 particular voyages.

The furthest points mentioned are:—

on the north, Japan

on the east, the Ryu-kyu islands, Formosa, the Philippine islands, Brunei, and Djakarta,

on the south, Djakarta,

on the west, Melaka, and Thailand.

The book contains instructions for navigating along the coast of the Malay Peninsula between Kelantan and Melaka,[34] and along the coast of Borneo between Pulau Balambangan and Brunei.[35]

It lacks any reference to places in the Malay Peninsula north of Melaka, and it lacks any itinerary to places further to the south-east than Brunei.[36]

It records no stellar altitudes. It is not free from error.[37]

(g) Chang Hsieh, *Tung Hsi Yang K'ao*, 'A Study of the Western and Eastern Oceans', 1618.

Parts of the book refer to events of an earlier period.

For the most part the work consists of historical and geographical notes on various countries in eastern Asia, from Japan in the north, Timor in the east, and Banten in the south, to Atjeh in the west. The ninth chapter, entitled 'A Study of the Ship's Master', contains (i) notes on navigational science and practice, (ii) notes on the ship's master and establishment, (iii) sailing instructions from Hsia Mên [Amoy] to various countries in eastern Asia; the furthest places mentioned are Formosa in the north, the Philippine islands, the Molucca islands, and Timor in the east, Banten and Djakarta ['Kelapa'] in the south, and Atjeh in the west.

The instructions treat of the route from Pulau Tenggol to Pahang[38] and thence round the Malay Peninsula as far as Bukit Jugra,[39] where the route crosses to Pulau Aroa (Aruah islands) and Sumatra; they also treat of the route running southwards past Pulau Balambangan to Brunei.[40]

They do not treat of any route along the mainland north of Pahang on the east coast, or north of Bukit Jugra on the west coast, or south of Brunei on the Bornean coast.[41]

Ships sometimes sailed straight from Grande Condore to Pulau Tenggol.[42] The book represents that the dividing line between the Western and Eastern Oceans ran from Hsia Mên [Amoy] to Brunei.[43]

No stellar altitudes are recorded.

The book contains some serious errors; thus, it states that Ta-ni [Pattani] was the ancient P'o-ni [Brunei],[44] and that Fei Hsin's Hsi-lan ['Ceylon', Sri Lanka] lay near the Lampung country in southern Sumatra.[45]

HISTORICAL INTRODUCTION.

The Arabs.

"It is a sound conjecture" wrote Hourani "that Arabs were playing some part in the seafaring life of their times for many centuries before Alexander [died 323 B.C.]",[46] and it is very probable that they had been sailing to Malabar for timber some centuries before the Christian era.[47]

But there is no record of their advancing further east before the seventh century A.D.

After the coming of Islam [A.D. 622] the Arabs grew more venturesome. In 651 they sent their first embassy to China.[48]

After the conquest of Iran in 652 the Arabs began to take over some of the Persian trade with the East, and Arab trade rose rapidly until 750.[49] By the end of the seventh century, Muslim settlements were established in Sri Lanka, and the Arabs had begun to penetrate the seas of south-east Asia.[50]

In 724 an Arab mission went to China, probably from Sumatra,[51] and it seems reasonable to suppose that the Arab traders found their way to China soon after that date.[52]

By the middle of the eighth century Arab colonies in Chinese ports were firmly established;[53] they and the Persians became the principal middlemen of the foreign trade with the south and west, and their ships were the chief means of communication.[54]

This state of affairs ended abruptly in 758 when Arabs and Persians, exasperated by official exactions, sacked Kuang Chou [Canton], and took their trade to Hanoi.[55]

Foreign trade revived at Kuang Chou in 792,[56] and by 851 there had grown up an extensive sea-traffic between China and the West.[57] This commerce reached its peak in 878, when it was violently disrupted by civil war in South China; Kuang Chou was pillaged and the Muslim trading posts destroyed.[58]

The Arab traders then terminated their voyages at Kalah (perhaps Kedah) on the west coast of the Malay Peninsula, and the Chinese trading ships sailed to Kalah to meet them.[59]

But 'the barbarian merchants of the sea' returned to China in 970,[60] and from this date until 1500 the Arabs remained the leading traders and mariners of the Indian Ocean.[61]

It may be added that by the end of the ninth century, a large area of south-east Asia was known to the Arab traders, and Arab seamen were well acquainted with the coast of the Malay Peninsula; but after leaving the important trading centre of Kalah, Arab ships ran straight through the Straits to water at Pulau Tioman, and in A.D. 1000 the Arabs knew the name of only one place on the Peninsula, namely, 'Panhang' [Pahang], peopled by sea-rovers.[62]

The Chinese.

Navigation on the high seas is first mentioned in annals of the third century B.C.[63]

Probably before the second century B.C. Chinese sailors sailed regularly along the coast to Tung Ching [Tongking.][64]

But progress was slow; even in the third century A.D. Chinese ships were

incapable of sailing in the open sea,[65] and by the end of the sixth century the ships of the Yüeh, the sailors of the China coast, probably sailed no further than the Gulf of Thailand.[66]

In the seventh century Chinese maritime enterprise began to manifest itself; in 607 a large Chinese ship voyaged to Ch'ih t'u (perhaps Phatthalung) in southern Thailand; this was regarded as exceptionally daring.[67]

At the end of the Sui dynasty (A.D. 618), Chinese ships were still inferior in all respects to the K'un-lun (Malaysian) and Indian ships.[68] There is no evidence regarding the further extension of Chinese shipping until the end of the eight century.[69] In the meantime Arab ships had arrived in China.

It was the corrupt governor Wang O, appointed to Ling Nan (Kuang Tung and Kuang Hsi provinces) in 795, who showed Chinese shippers the way to Malaysian waters; during an undetermined period which ended in 801 he despatched ten heavily-laden boats to the Nan Hai (South Seas), every day, the return journey taking one year.[70] By 805 Chinese ships were sailing as far as the north coast of Sumatra along the great trade-route from China to India,[71] and by 842 Chinese vessels sailed across the ocean to Korea and Japan.[72]

In 879 when the sack of Kuang Chou caused the western merchants to terminate their voyages at Kalah, Chinese merchant ships travelled there to meet the ships from Siraf and Oman.[73]

In 1132 the Sung emperor established a permanent navy, and about 1150 China became a 'sea power'.[74]

Before 1178 Chinese merchants sailed their ships to India, and succeeded in wresting from the Arabs the monopoly of the freight and passenger business.[75]

By 1250 the Sung navy controlled the East China Sea.[76]

The powerful fleets of the Mongol emperors (1280—1368) controlled the South China Sea, and ensured the safety of sea-travel between China and Western Europe.[77]

By 1286 Chinese merchant ships had begun to sail as far as Aden.[78]

Towards the end of the thirteenth century Chinese shipping to southern India reached its peak.[79]

Mongol envoys travelled as far as Mogadiscio in Africa.[80]

The Yung Lê emperor (1403—1424) of the Ming dynasty despatched a series of enormous naval expeditions to the 'Western Ocean', mostly under the Grand Eunuch Chêng Ho. Melaka was visited at least five times, and probably seven times, by Chêng Ho's fleets.[81]

Chêng Ho's first three expeditions (of 1405, of 1497, and of 1409) made their terminus at Calicut.

On the fourth expedition (of 1413) a squadron sailed to Bengal, and the main fleet went to Hormuz in Iran.

On the fifth expedition (of 1417) the main fleet again travelled to Hormuz, while 'detached' ships went to Aden and to Malindi in Africa. In 1421 four Chinese fleets were traversing the Indian Ocean at the same time, one of them being Chêng Ho's sixth expedition (of 1421) which terminated at Hormuz.

This year marks the zenith of Ming naval expansion.

China was the paramount sea power of the Orient.[82]

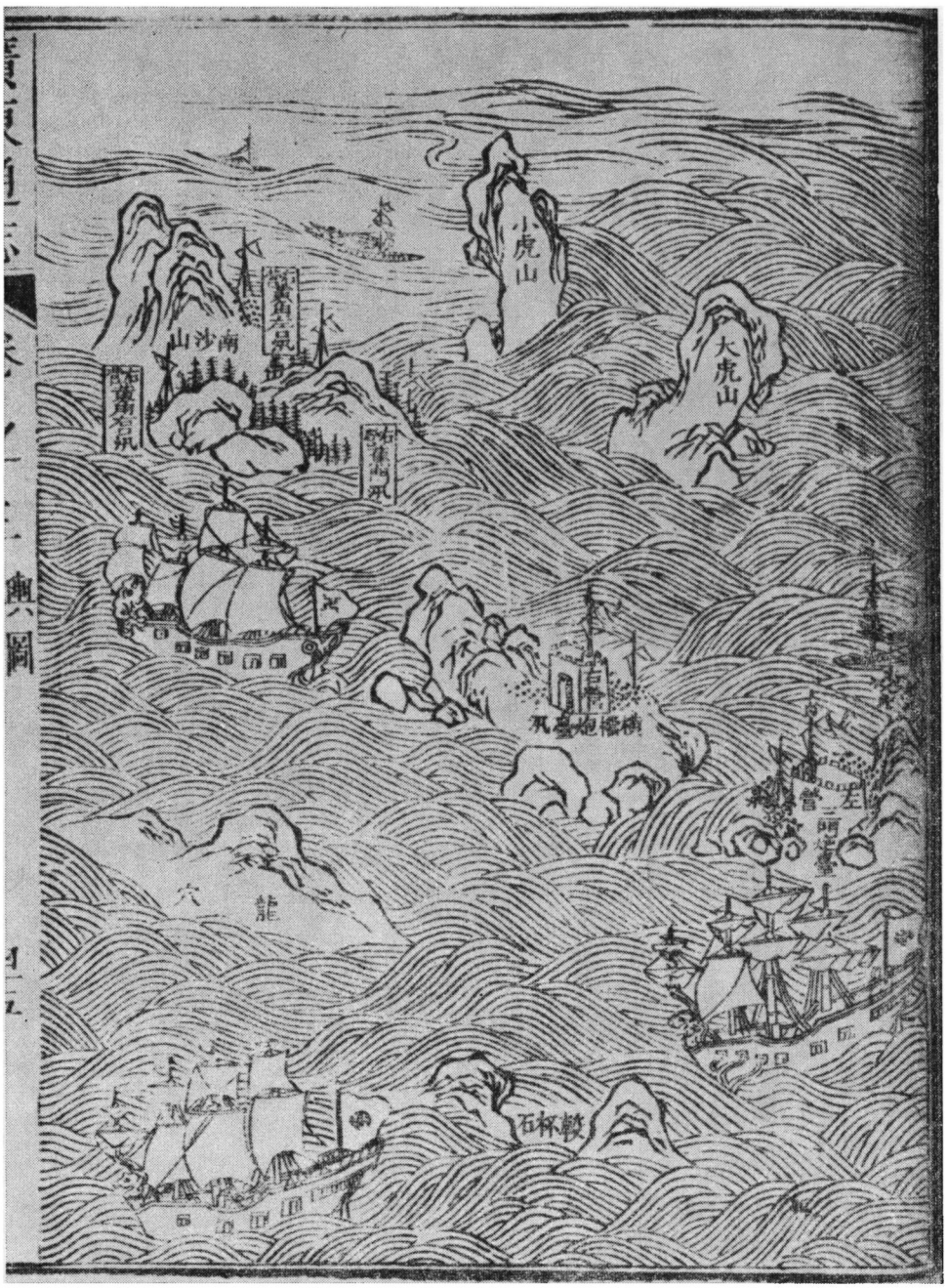


Plate 2. Print of Three Chinese ships negotiating the Bocca Tigris or Bogue, in the estuary of the Chu Chiang (Pearl River) between Hsiang Chiang (Hong Kong) and Ao Men (Macao).
From the *Kuang Tung T'ung Chih*, ('Topography of Kuang Tung Province') compiled by Ho Yu-Lin and others. 1731. ch. 3, f.45.
Reproduced by Courtesy of the Royal Asiatic Society, London.

On Chêng Ho's seventh and last expedition (ordered by the Hsüan Tê emperor in 1430), the main fleet voyaged to Hormuz, 'detached' ships travelled to Aden and to Giumbo in Africa, and emissaries visited Mecca.[83]

After 1433 the Chinese navy was allowed to disintegrate.[84]

Following a period of quiescence, before 1487 there started a great efflux of Chinese trading junks from ports in South China to south-east Asia.[85]

For about a hundred years, from about the beginning of the fifteenth century to the beginning of the sixteenth century, the Chinese controlled all the commerce in the waters of the Far East.[86]

Borneo.

The relative isolation of Borneo was breached through Indian influence in the fifth century A.D., and in the following century Borneo traded with the outside world, probably the entrepot centres on the east coast of the Malay Peninsula or on the east coast of Sumatra.[87]

In the ninth century P'o-ni, 'Brunei', had become a trading centre, and its people were going to trade in an unascertained locality, probably situated on the gulf of Thailand.[88]

At the beginning of the tenth century Chinese were carrying on commercial exchanges in the Santubong delta of western Sarawak.[89]

In 977 a trader bearing the Arabic name P'u Lu-hsieh [Abu Luhayy?], from Kuang Chou or Ch'üan Chou, opened relations between China and Brunei. The ruler, named Hsiang-ta sent an envoy, P'u A-li ('Abu Ali'?), with tribute to the court of China.[89a]

At the end of the tenth century Kuang Chou and Ch'üan Chou were carrying on direct trade with western Borneo.[90]

In 1082 the ruler of Brunei, Hsi-li Ma-jo ('Seri Maharaja'?), sent an envoy with tribute to China.[91]

In 1226 the sultan of Brunei had a defence force including more than one hundred fighting boats.[92]

In 1350 the Chinese were trading in P'o-ni (Brunei), Kou-lan (Gelam island), and Tung-chung Ku-la (Tanjong Pura).[93]

In 1370 the emperor of China sent an envoy to the sultan of Brunei, Ma-ha-mo sha ('Mahmud Shah'?), and in the following year the sultan appointed envoys to carry tribute to the Chinese court.[94]

In 1405 the emperor sent an envoy to the ruler of P'o-lo on the north coast of Borneo; in the following year an eastern ruler and a western ruler of P'o-lo presented themselves at court; and P'o-lo sent another envoy with tribute in 1407.[95]

During the period 1405 to 1425 intimate relations were maintained between the courts of China and Brunei, now also called Wên-lai; the emperor thrice sent envoys to Brunei between 1405 and 1411; and the rulers of Brunei despatched ten tribute-bearing embassies between 1405 and 1425.

In 1405 the name of the ruler was Ma-na-jo Chia-na ('Maharaja Kala?') according to the *Ming Shih* (Ming Annals), and Ma-na-jo Chia-na-nai according to Li Hsien.

The ruler Ma-na-jo Chia-na and in 1408 the ruler Hsia-wang ('Awang'?) visited the Chinese emperor.[96]

In 1436 the Chinese were trading with Chiao-lan shan (Gelam island) and P'o-ni (Brunei).[97]

During the fifteenth century Philippinos and Borneans shipped goods to Melaka, and Melaka sent trading ships to four Bornean ports, including Tanjong Pura and Lawe (Pontianak?).

These two ports also traded with Sunda Kelapa in western Java.

The Bornean ports did more trade with Java than with Melaka.

By 1500 both Muslim and Chinese merchants had settled in Borneo.[98]

NAVIGATION

Ships

The large Arab trading ships attained a length of about 110 feet;[99] the hull was composed of planks stitched together with palm fibre; Hourani says that they were likely to disintegrate in heavy weather;[100] the ships were double-ended, coming to a point at both bow and stern;[101] they usually carried one mast, but sometimes two.[102] Such ships could be made to accommodate up to 400 persons. The large Chinese trading ships probably attained a length of about 250 feet;[103] such ships were strongly constructed, with iron fastenings;[104] the ship was rectangular, and about 110 feet broad;[105] such a ship would carry six masts.[106] Such ships could be made to accommodate up to 800 persons.

Sails

Arab ships had a triangular lateen sail, slung fore-and-aft.[107]

Chinese ships had a rectangular balance lug, stiffened with battens.[108]

Compendia

Both Arab and Chinese ship-masters were provided with charts and books of sailing instructions.[109]

Compass

The Arab compass card contained a design ('rose') in which the circle was divided into 32 'rhumbs' or points, being north and south and 15 points named after the rising and setting of 15 fixed stars. The north was named *al-Jah*.[110]

In the Chinese compass the circle was divided into 24 points named after the 'branches' and 'stems' of Chinese philosophy, and by a combination of 2 contiguous points, the total number was raised to 48, indicating equal divisions of $7\frac{1}{2}°$.

The Chinese could also change course by an angle of $3\frac{3}{4}°$ by travelling for one half of the specified time on one bearing and for the other half of the specified time on the contiguous bearing.

The north was named *tzû*.[111]

Stellar altitudes

(To find the approximate latitude of a place, about 3° 30′ must be added to the altitude of Polaris at that place in the year 1500).[112]

To ascertain the latitude, the Arabs measured the altitude of various stars, including the Pole Star, above the horizon.

The measurement of the angle was made in terms of a finger *(isba)* of 1° 36′

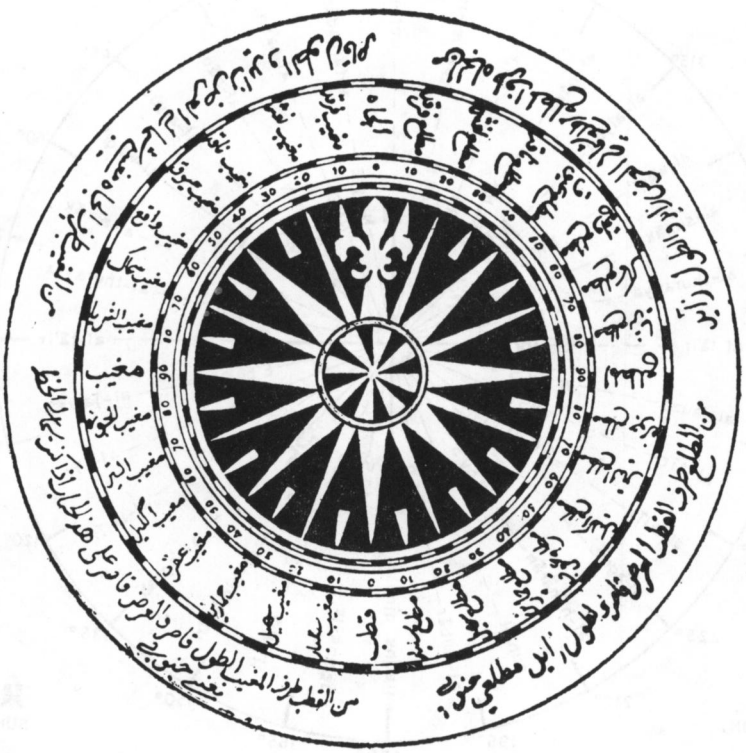


Fig. 7. — Rose azimutale des Maldives.

Arab compass

Plate 3. Copied by John Prinsep at Calcutta about 1836 from a practical work on navigation, called *Majid Kitab*.

The compass lacks accuracy since few of the prominent stars selected rise or set at the precise azimuth named from them.

The names would seem to point to a time anterior to the invention of the magnetic compass, probably about A.D. 960.

References. *Journal of the Asiatic Society of Bengal* (1836), p. 784 *et sqq.*; G. Ferrand, *Instructions nautiques et routiers arabes et portugais des XV et XVI siecles*, vol. III, Paris, 1928, pp. 9–12..

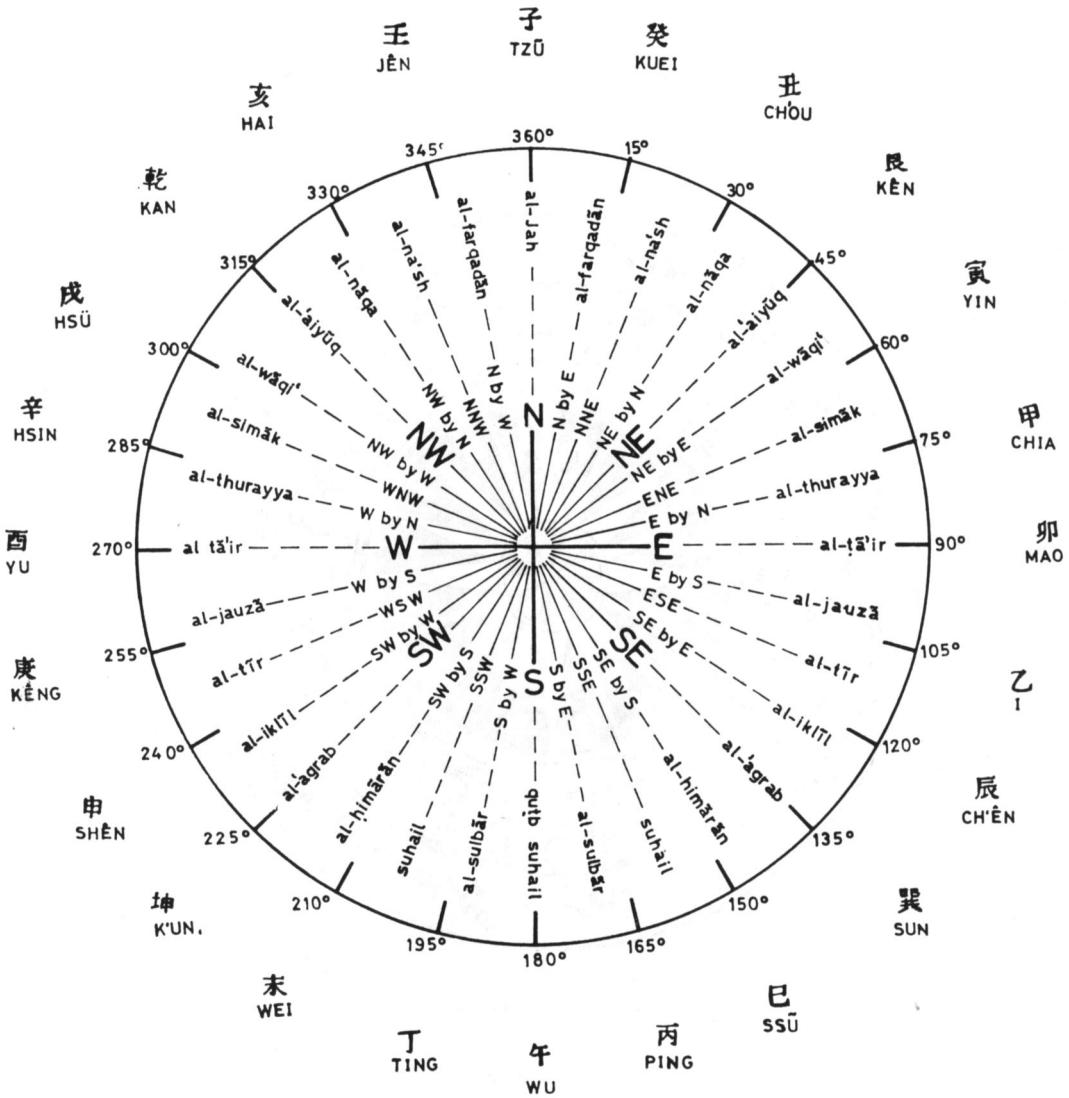


Plate 4. Composite English Arab/Chinese Compass. Constructed by the author for publication with this article. In the English compass.....

Composite English-Arab-Chinese compass

In the English compass, the circumference of the circle is equally divided at 32 points, bearing the names of the 4 cardinal points North, South, East, and West, and variations based on those names.
In the Arab compass, the circumference of the circle was divided at 32 points, being North (*al-Jah*) and South (*qutb suhail*) and 15 points at which certain prominent stars rose and 15 points at which they set: these points do not represent an equal division of the circumference.
The stars of the Arab compass may be identified as follows:—
al-farqadān, Beta and Gamma or Ursa Minor, al-naʿsh, Alpha or Zeta of Ursa Major,
al-nāqa, Alpha or Beta of Cassiopeia, al-ʿaiyūq, Capella, al-wāqiʿ,Vega, al-simāk,Arcturus,
al-thurayya,Pleides, al-ṭā'ir,Altair, al-jauzā, Orion's belt, al-tīr,Sirius,
al-ikīl, Beta,Delta, and Pi of Scorpio, al-ʿagrab,Antares,
al-ḥimārān,Alpha and Beta of Centaurus, suhail,Canopus,
al-sulbār,Achernar. [See Tibbetts (1), pp.296–297]
In the Chinese compass, the circumference of the circle was equally divided at 24 points, named after the 'stems' and 'branches' of Chinese philosophy.

25″, and a *zam* of one-eigth of a finger, that is, 12° 03′.[113]

The instrument used by Ahmad and Sulaiman was called a *khashaba*, a form of wooden tablet, which must have had graduations of *isba;* the observer took the *khashaba* with the arm extended, in such a way that the top of the tablet was seen to touch the star and the bottom to touch the horizon.[114] The Arabs measured the altitude of nearly 70 stars and star-groups, seven being particularly important.

Most important was the Pole Star (Polaris, Alpha of Ursa Minor).[115]

The Arabs reckoned that when the altitude of Polaris was 1 finger, the altitude of the Farqadan or 'Calves' (Beta and Gamma of Ursa Minor) was 8 fingers, and that when the altitude of the Farqadan was 1 finger, that of al-Na'sh (Delta, Eta, and Zeta of Ursa Major) was 13 fingers.[116]

Al-murabba' (Alpha of Crux) was particularly useful, rising as Polaris fell, always by the same amount.[117]

Presumably ships' captains carried tables of Pole Star altitudes of important places.[118]

The accuracy of the measurements differed very greatly.[119]

The Chinese, too, adopted the method of measuring the altitude of certain stars above the horizon.

The measurement of the angle was made in terms of a finger *(chih)* of 1° 36′ 25″, the same figure as that used by the Arabs.

They divided the *chih* into 4 *chüeh* ('fraction') of 24′ 06″.[120]

The instrument used by the Chinese was probably some sort of cross-staff.[121] The most important star was Polaris (Pei Ch'ên).

The Chinese reckoned that when the altitude of Polaris was 1 finger, the altitude of Hua Kai ('Imperial Palanquin', 50 of Cassiopeia) was 8 fingers.[122]

After Polaris, the next most important stars were Hua Kai (mentioned many times in the Mao K'un map) and Têng Lung Ku ('Lamp Frame', Crux) mentioned several times in 'Shun Fêng'.[123]

Like the Arab measurements, the Chinese measurements differed greatly in accuracy.[124]

Time

The Arabs measured the 4 three-hour periods of the twelve-hour tropical night by observing the positions of the stars in the tail of Ursa Major *(Banat al-Na'sh)*.[125]

The Arab unit of time was a three-hour watch called a '*zam*', thus 8 *zam* were sailed in one day and night.[126]

The Chinese unit of time was a 'watch' of 2.4 hours called a *kêng*, and 10 *kêng* made one day and night.

The duration of a watch was indicated by the burning of an incense-stick whose rate of burning was already known; it would be easy to measure time approximately enough with such a 'joss-stick'.[127]

Distance

In Arab theory the distance travelled in order to raise the Pole Star by 1 *isba* (that is, by 1° 36′ 25″) when sailing due north amounted to 8 *zam*; hence, 1 *zam* measured 12.05 miles.[128]

In practice, the Arabs also attempted to make oblique measurements[129] but they were basically at fault with their trigonometry.[130]

The texts record measurements of distance along a number of routes, especially between places lying on the same latitude.

In or near Malayan waters, the Arab texts give the following measurements:— Kedah to Pulau Pinang, 4 *zam* (in theory, 48.2 miles) [Kuala Kedah to Pinang, actually 40 miles],

Pulau Pinang to Pulau Perak, 8 *zam* (in theory, 96.4 miles) [actually, 75 miles],

Kuala Pasai to Dindings, 13 *zam* (in theory, 156.6 miles) [actually 217 miles].[131]

Since the Arabs measured this distance, presumably they sometimes crossed by this route.

The method for measuring distances is not known; they may have been calculated from the number of watches taken.[132]

In Chinese theory the *kêng* or watch of 2.4 hours was considered to be the equivalent of 60 *li* or 8.7 miles or 7.6 sea-miles.[133]

Chinese charts and nautical compendia never record distances.

Speed

For Arab ships a normal speed was between 2 and 4 knots; on one occasion it might have been 5 knots at least.[134]

The Chinese equivalent of 60 *li* to 1 kêng of 2.4 hours equivalent to 7.6 knots, could have been attained only in very favourable conditions.

It seems reasonable to suppose that on a long journey a fair average would have been attained on the journey from Male in the Maldives to Mogadiscio in east Africa; this voyage of about 1693 sea-miles was made in 150 watches, at a speed of 4.7 knots.

The fastest recorded run on a long voyage made by Chêng Ho's ships was one from Calicut to Kuala Pasai, 1491 miles in 14 days or 4.4 knots.

The fastest journey recorded in the Mao K'un map over a short distance was made at 5.7 knots.[135] 'Shun Fêng' records a journey of 74 miles from Pulau Tenggol (Tunggal) to Kuala Pahang made in 5 watches (12 hours), a speed of 6.1 knots.[136] As a rough guide, one might say that in the open sea Chinese ships at this time travelled at about 4 knots, 10 miles to a watch, and 100 miles in a day and night of 10 watches.

Navigational methods

For both Arabs and Chinese the most important matter was the navigator's knowledge of guides and aids, such as tides, winds, land-marks, *et cetera*;[137] and voyages were undertaken at times when it was possible to take advantage of the moonsoon winds.[138]

For the Arabs the most important techniques were (a) the ascertainment of direction by means of the magnetic compass; ordinarily this was the most important technique;[139] (b) the measurement of stellar altitudes to ascertain latitude; ordinarily this was subsidiary;[140] (c) the measurement of depths by means of the plumb-line; in dangerous waters this was the most important technique.[141]

Arab navigators ordinarily sailed to a convenient point either due east or due west of their terminal port, and then travelled along the parallel of latitude.[142]

They could change direction by 'tacking' (turning the bow into the wind), but normally did so by 'wearing' (turning the stern to the wind).[143] For the Chinese the pre-eminently important technique was the ascertainment of direction by means of the magnetic compass. The measurements of stellar altitudes were unusual. Soundings were taken when the navigator felt it necessary.[144]

The Chinese showed no predilection for 'sailing along the latitude', but travelled readily in all directions. 'Bringing a mark abeam' was a feature of Chinese navigation. They usually changed direction by tacking.[145] The Chinese ship could sail closer to the wind than an Arab ship of the time.[146]

THE VOYAGES
The west coast of the Malay Peninsula

1. North of Bukit Jugra

TABLE I

Arab name	Chinese name	Altitude of al-Farqadan and corrected latitude	True latitude	Modern name
Butang[1]	Ku-li-yu Pu-tung(1)	[8½] f. 5°54′N.	c.6°34′N.	Butang group[147]
Lakawi[2]	Lung-ya-chiao-i(2)	8 f. 5°06′N.	c.6°22′N.	Pulau Langkawi
Keda[3]		8 f. 5°06′N.	6°06′N.	Kuala Kedah
	Chi-ta haven(3)		5°40′N.	Kuala Merbok
Pualu Pinang[4]	Pin-lang island(4)	7¾ f. 4°42′N.	c.5°24′N.	Pulau Pinang
Kra[5]		7¾ f. 4°42′N.	5°08′N.	Pulau Kra
Pan Kura[6]			4°24′N.	False Dindings (Bukit Segari)
Dingding[7]		7½ f. 4°18′N.	c.4°19′N.	Dindings district
Pulau Sembilan	Chiu islets(5)	7¼ f. 3°54′N.	c.4°01′N.	Sembilan islands
Malacca[8]				
Pulau Tanburak[9]	Ch'ên Kung island(6)		3°58′N.	Pulau Jarak
Salang[10]		7 f. 3°30′N.	c.3°20′N.	Selangor (territory)
Balang Salang bay[11]			c.3°15′N.	(Near Sungei Buloh)

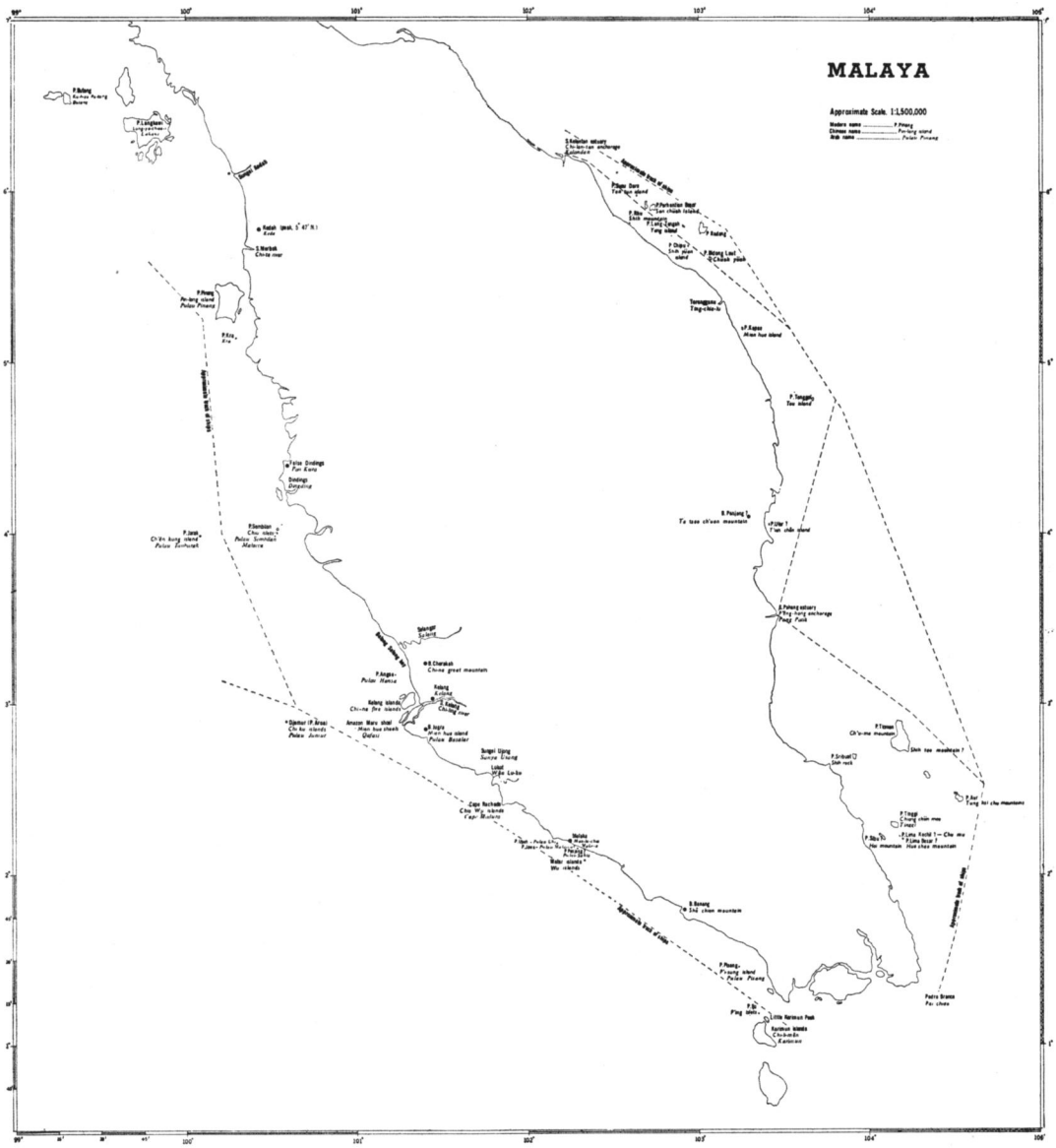


Fig. 1. Map of Peninsula Malaysia

Table I *(Cont.)*

	Chi-na great(7) mountain		3°14′N.	Bukit Cherakah
Pulau Hansa[12]			3°11′N.	Pulau Angsa
	Chi-na five(8) islands		c.3°00′N.	Kelang islands
Klang[13]		7 f. 3°30′N.	3°02′N.	Kelang
	Chi-ling haven(9)		3°00′N.	Sungei Kelang
Pulau Basalar[14]	Mien hua island(10)	6½ f. 2°42′N.	2°50′N.	Bukit Jugra

See British Admiralty charts 830, 1353, and 1358, and 'Pilot' No. 44 with Supplement No. 1 — 1972.

Sailing directions

The Arab texts state that the navigator travelling south along 'the coast of Siam' reaches 'the islands of Takwa', the most southerly of which is Butang, where the altitude of the Pole Star is 1½ fingers. They then enumerate the other places listed in the above Table.[148] They name 14 places, including Butang and Pulau Basalar [Bukit Jugra], and they give a stellar altitude for 10 of these places.

Sulaiman includes the following bearings, (a) from Pulau Butang to 'Pulau Basalar' [Bukit Jugra], SSE; (b) from 'Pulau Sanbilan Malacca' to 'Pulau Jumar' [Djemur], S for 6 *zam* [in theory, 72.3 miles]; (c) from 'Pulau Jumar' to 'Pulau Basalar', SE by E, *aliter* ESE; (d) from Pulau Pinang to 'Pulau Sanbilan', SSE.

The direction from the Sembilan islands to Djemur is adequate and tells the navigator exactly where he is; actually the bearing is exactly 180° and the distance 65 miles.

For the westward journey, Sulaiman gives the following bearings, (a) from Djemur to the Sembilan islands, N; (b) from the Sembilan islands to Pulau Butang, NNW.[149]

The Arab crossings were as follows:—

Eastward

(1) Southward along the coasts of Burma and Thailand as far as Pulau Butang, thence to Pulau Sembilan and Djemur.

(2) From Great Nicobar South-by-East to the vicinity of Pulau Pinang, thence to Pulau Sembilan and Djemur.

(3) From Sumatra by way of Pulau Berhala and Pulau Pandan to Djemur.

(4) Presumably, from Kuala Pasai to the Dindings.

Westward

(5) From Djemur to the Sembilan islands and Pulau Butang, thence to the Nicobar islands.

(6) From Djemur to the Sembilan islands and Pulau Pinang, thence by way of Pulau Perak to Sumatra.

The Mao K'un map is the only Chinese text which mentions places north of Bukit Jugra; it names 10 such places; it gives no compass bearings, no stellar altitudes, and no depths; it gives no route-tracks along this coast, and no other indication that Chinese ships ever visited here.[150]

To compare the texts: the Arabs give certain sailing directions, of which some are adequate and some inadequate; they name 14 places, and give the stellar altitudes of 10; the Chinese give no sailing directions; they name 10 places, and nothing more.

Indentifications

Most of the Arabic names are easily recognizable.

Kra denotes Pulau Kra between Pulau Pinang and the mainland.

The name Pan Kura is a corruption of 'Pangkor'; but the place Pan Kura means False Dindings (Bukit Segari) which resembles Pulau Pangkor when seen from the north.

Pulau Tanburak was the name given by the Arabs to Pulau Jarak.

Salang means Selangor.

The name 'Balang Salang' cannot be explained; and the first word may be a corrupt reduplication of the second; there is a recession of the land between Tanjong Karang and Jeram, but modern geographers do not designate this a 'bay'.

Pulau Hansa bears the modern name Pulau Angsa.

The name 'Klang' speaks for itself.

....Pulau Basalar denotes Parcellar Hill, now called Bukit Jugra;[151] the name Parcellar may have been given by Arabs or Indians who saw some topographica feature which reminded them of Barselor, now Barkur, on the west coast of India.

The first three Chinese names are transliterations of 'Kulao (Pulao) Butang', 'Langkawi', and 'Kedah', respectively; but whereas by 'Keda' the Arabs referred to the locality of the Kedah river, the Chinese by 'Chi-ta (Kedah) haven' (river) meant the Sungei Merbok.[152]

Pin-lang is the usual Chinese transliteration of the Malay 'Pinang'. Chiu ('Nine') islets are the Sembilan (Malay, 'Nine') islands near the mouth of the Sungei Perak.

Ch'ên Kung ('Master Chên') island denotes Pulau Jarak.

Chi-na represents the Malay name 'Cherakah', Bukit Cheraka having once been known as False Parcellar.

Chi-na five islands are the Kelang islands (Pulau Kelang, Pulau Ketam, Pulau Lumut, etc.) off Kuala Kelang.[153]

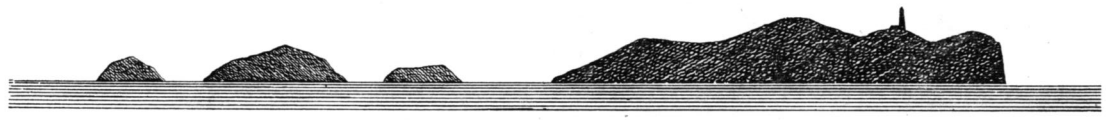
Mien hua ('Cotton') island is Bukit Jugra, once known as Parcellar Hill.[154] Views may be seen in 'Pilot' No. 44, pages 420 to 424.

[27] (*page 160*)

Bukit Jugra.

Bukit Jugra, bearing 020°, 12½ miles.

[28] (*page 172*)



Cape Rachado lighthouse, bearing 113°, 23 miles.

(*Original dated* 1942.)

Plate 5. Views published in the 'Malacca Strait Pilot 1971.'
(a) Bukit Jugra.
(b) Cape Rachado (Tanjong Tuan) lighthouse.

2. Djemur to Bukit Jugra

TABLE II

Arab name	Chinese name	Altitude of al-Farqadan and corrected latitude	True latitude	Modern name
Pulau Jumar[15]	Chi ku islands *(11)*	6¾ f. 3°06′N.	2°53′N.	Djemur[155]
Qafasi[16]	Mien hua shoals *(12)*	6¾ f. 3°06′N.	2°51′N.	Amazon Maru shoal
Pulau Basalar[17]	Mien hua island *(13)*	6½ f. 2°42′N.	2°50′N.	Bukit Jugra

See British Admiralty chart 1358, and 'Pilot', No. 44.

Sailing directions

The Arab texts contain more than one account of the passage between the North Sands and the South Sands; the best account is that of Sulaiman.

"When you approach Jumar turn SE. by E. for a *zam* then take ESE. Now, due SE. from the island of Jumar there is a bank, over which the waves break, but you continue on your way ESE., the depth decreasing until it reaches 18 fathoms or thereabouts. Continuing ESE., when Jumar appears level with the surface of the sea, then you should see directly in front the mountain of Pulau Basalar. Still continue ESE, and the depth will be about 16 or 17 fathoms.

If it decreases to 15, incline to the right, but if it increases to 18 then incline to the left; you should make this a habit. Now beware of the tide, whenever it is with you and the wind is rough (tricky), then let down the anchor lest the current carry you into shallow water. When you are near Pulau Basalar, the mainland which is to the south of it will be visible. Then examine the shallows until it is 8 fathoms, then 7, then 6, and when the depth remains at 9 fathoms or about that, this is the bank of Qafasi which are reefs. When you are on this route continue in the same direction which you have followed since Jumar, keeping the boat before you. Keep taking the depth, I mean, when you are in this shallow place with the depth at about 7 or 8 fathoms. You should continue on the above mentioned course, and after these shallows the depth will increase to 15 and 20 and 25.

Now you have escaped [from this], so turn about this time to the land and take a course close to the mainland to the SE."[156]

And for the journey westward:—

"... you see Pulau Basalar in the NEE. Then take WNW. and the depth will be between 35 and 20 fathoms. Continue thus until the depth decreases to 15 and then to 7 or 8. You will now find yourself over the above-mentioned bank. Conti-

nue straight ahead in the same direction until the depth increases again to about 15, and then go on till you sight Pulau Jumar when the depth will be about 30–40 fathoms. Now is the time to turn due north until you come to the islands of Pulau Sanbilan".[157] Ahmad adds that the water on Qafasi bank was discoloured.[158]

Three Chinese texts give directions for the journey:

(1) "Chi ku islands [Pulau Aroa]; steer 112½°; 3 watches; make Mien hua island [Bukit Jugra]";[159]

[In this text it seems likely that the author has omitted to mention a stage of 3 watches between the shoals and Bukit Jugra].

(2) "After making Chi ku islands, steer exactly 120° and [then] 112½°; after 3 watches the ship is level with Mien hua shoal [Amazon Maru shoal]. Steer 112½° and [then] exactly 120°; after 3 watches the ship is level with Mien hua shoal [read "Mien hua island", [Bukit Jugra]".[160]

And for the westward voyage:—

(3) "Mien hua island [Bukit Jugra]; steer 292½°; cross the sea; 4 watches; pass the shallows; make Chi ku islands [Pulau Aroa]".[161]

Bearings

North Sands and South Sands are dangerous shoals with a channel 4 miles wide between them.

Both the Arab and the Chinese directions may be considered adequate. When the course recommended by Sulaiman is laid down on the modern chart, a change of bearing from 180° to 112½° will take the navigator through the middle of the channel if he changes course when 6 miles north of Djemur; and he will clear the shoals if he changes course when not more than 8 and not less than 4 miles north of Djemur. Chinese ships came down on a bearing of 127½° from the Brothers (3°26′ N., 99°46′ E.), and presumably changed course when they brought Djemur abeam. For ships changing course to 112½°, as in text (1), the same figures apply as to the Arab ships; ships changing course to 120° and then 112½°, as in text (2), will pass through the middle of the channel if they change course when 7 miles distant from Djemur, and will clear the shoals if the change is made when the ship is not more than 9 and not less than 5 miles from Djemur. This may be considered satisfactory.

If they were off course, presumably the sight of 'discoloured water' would enable the navigator to rectify the position.

It is worth noting that in this dangerous crossing the Arabs took soundings constantly, but the Chinese not at all.[162]

Chinese ships westward bound must have changed course when Bukit Jugra bore 21° (about NEE.), 12 miles distant.

This route *via* Pulau Aroa is the only east-west crossing recorded in the Chinese texts. The Arabs, as above stated, sailed westward from Pulau Butang to the Nicobars, and from Pulau Pinang to Sumatra, and eastward from Great Nicobar to Pulau Pinang, from Pulau Pandan to Djemur, and presumably from Kuala Pasai to Dindings.[163]

In modern times the 'Pilot' gives the following directions:—

"A vessel approaching from north-westward should sight Djemur light-house

and thence steer to make One Fathom Bank lighthouse bearing about 112°, passing about 2 miles south-westward of it, taking care to avoid Amazon Maru shoal; thence she should steer as necessary to pass about 6 miles off Tanjong Kling [near Melaka]".[164]

A 'reasonable' course for a junk or dhow when 5 miles north of Djemur would be to bear 109° to pass through the middle of the channel between North and South Sands, and then bear 155° to a point where Bukit Jugra is brought abeam, 12 miles away.

Identifications

Djemur speaks for itself.

The Arab name Qafasi or Kafasi is a transliteration of the Cham *kapah* or Malay or Hindustani *kapas*, 'cotton'; the Portuguese called it Capasia, Capaçia, or Capacia; the Italians, Capasa, Capaçia, or Capacia; the French, Capacias, or Capaciar.

The Chinese put the matter beyond doubt by translating the name 'Mien hua', 'cotton', and by applying the same name 'Mien hua' to Pulau Kapas off the coast of Trengganu. By 'Qafasi', the Arabs meant the southern end of the North Sands and the northern end of the South Sands and the channel between them.[165] Pulau Basalar is generally agreed to be Parcellar Hill or Bukit Jugra.[166] The Chinese associate the hill with the shoals by calling them both 'Mien hua', 'cotton'.

The three Malay names Pulau Sembilan, Djemur, and Pulau Angsa suffice to prove the position of Qafasi; and additional proof is supplied by the bearings or approximate position of Pulau Berhala (Arab, Pulau Berhala; Chinese, Tan hsü, 'Single island'), The Brothers (Arab, Pulau Pandan; Chinese, Shuang hsü, 'Double islands'), and Kelang (Arab, Klang; Chinese, Chi-ling). So, too, the Chinese Chi ku hsü, 'Chicken Bone islands', are shown to be Pulau Aroa.[167]

Views of Bukit Jugra may be seen in 'Pilot' No. 44, page 424, and in Wheatley, p. 236.

Djemur to Bukit Jugra

TABLE III

Arab course	Chinese course	'Reasonable' course	Time (watches & hours)	Approximate distance (miles)	Speed (knots)
Djemur to Amazon Maru shoal	112½°; or 120°, then 112½°	109°	3 / 7.2	25	3.4
Amazon Maru shoal to Bukit Jugra (abeam)	112½°, then 120°	115°	3 / 7.2	23	3.1
			6 / 14.4	48	
				Average	3.3

3. Bukit Jugra to the Karimun islands.

TABLE IV.

Arab name	Chinese name	Altitude of al-Farqadan and corrected latitude	True latitude	Modern name
Pulau Basalar[17]	Mien hua island(13)	6½ f.2°42′N.	2°50′N.	Bukit Jugra
Sanya Usang[18]		6¼ f.2°18′N.	c.2°43′N.	Sungei Ujong
	Wên lu ku(14)		2°35′N.	Lukut
Cape Madura[19]	Chia Wu islands(15)		2°24′N.	Cape Rachado
Pulau Ubi[20]			2°12′N.	Pulau Upeh
Malacca[21]	Man-la-chia(16)	6 f.1°54′N.	2°12′N.	Melaka
Pulau Malacca[22]			2°11′N.	Pulau Jawa
Pulau Sabta[23]			2°09′N.	Pulau Panjang?
	Wu islands(17)		c.2°03′N.	Water islands
	Shê chien mountains(18)		1°48′N.	Bukit Banang
Pulau Pisang[24]	P'i-sung island(19)		1°28′N.	Pulau Pisang
	P'ing islets(20)		1°12′N.	The Brothers (Pulau Iju)
Karimun[25]	Chi-li-mên(21)	5¾ f.1°30′N.	c.1°08′N.	Karimun islands

See British Admiralty chart 1358, and 'Pilot', No. 44, with Supplement No. 1-1972.

Sailing directions

Arab

Ahmad writes:—

(1) "When you are over Qafasi and when you come out from it, the water increases to 12 and you take water at 24 for fear of banks between it and Mal'aqa. There are two banks, one 2 *zam* beyond Qafasi and one between Qafasi and Mal'aqa and they are all of them 8 *zam* [in length].

When you have left them behind you, travel nearly 6 *zam*, four into the mainland and the rest [parallel to it] until you see the four islands, Pulau Mal'aqa, Pulau Sabta, and their fellows. The one nearest the shore should be to your left and the other three to your right and you sometimes see the houses. Then cast (anchor) in the harbour".[168]

Sulaiman writes:—

(2) "Then from Pulau Basalar to Malacca it is SE., and from Malacca to Singapur, and this is the end of Siam to the South and there the Guardians [Beta and Gamma of Ursa Minor] are 5° [*fingers*] [above the horizon]".[169]

(3) " you see the mountain of Pulau Basalar in the NE. Then sound the water and take 24 fathoms, taking care here of a bank connected to the mainland. Go ahead in 24 fathoms until you see Mount Pulau Basalar to the NNE., and this time nearer to the land, then follow the mainland to Malacca".[170]

(4) [After leaving 'the bank of Qafasi'] "Now you have escaped [from this], so turn about this time to the land and take a course close to the mainland to the SE. The depth will be about 25 fathoms, and in an hour 30 fathoms, then 25, and in another hour 20 fathoms, increasing and decreasing at every sounding by about 5 or 6 fathoms. Notice that the sea bottom rises and falls. Keep on this course and when the tide turns back upon you and the wind is rough, then drop anchor. So continue until you come to Malacca. In front of it you will see the islands Pulau Sanba (?) and the island of Ubi (?). Boats will then come out to you. Prepare yourself for entering the harbour."[171]

And in the opposite direction:—

(5) "When you leave Malacca you follow the land to Mount Pulau Basalar, and beware of the bank mentioned before. When you see Mount Pulau Basalar in the direction E by S. you turn NW by W. until you see Pulau Jumar a short distance off. When you have left it behind you, turn due north until you sight the islands of Pulau Sanbilan, and when you come to these you turn NNW. for a little [?] to Pulau Batagh; and from there you travel W by N. to the islands of Naja Bara [Nicobars]".[172]

(6) [From Melaka] "When you leave the harbour ride straight out to sea until the depth is 20 or 25 fathoms, for this is the best and easiest method. Then take the direction NW. and the depth 25 fathoms or thereabouts until you see Pulau Basalar in the NNE. Then take WNW. and the depth will be between 35 and 20 fathoms. Continue thus until the depth decreases to 15 and then to 7 or 8. You will now find yourself over the above-mentioned bank."[173]

Chinese

The Chinese directions are as follows:—

(7) [From Bukit Jugra] "Steer 127½°; after 10 watches the ship is level with Man-la-chia [Melaka]. The ship starts from Man-la-chia; steer 127½°; after 5 watches the ship is level with Shê chien mountain [Bukit Banang]. Steer 127½°; after 3 watches the ship is level with P'i-sung island [Pulau Pisang]. Steer exactly 135°, and make Chi-li [*read Chi-li-mên*, Karimun islands]".[174]

(8) [From Melaka] "Set sail from Wu islands [Water islands] strait; steer 127½°; 5 watches; the ship is abreast of Shê chien mountain; take a sounding, 19

fathoms; steer 127½°; 5 watches; the ship makes K'un-sung [*read P'i-sung*], island; take a sounding, 12 fathoms --- exactly 135°; 3 watches; make Chi-li-mên mountain".[175]

(9) "Put to sea at Wu islands; 142½°; 5 watches; the ship makes Shê Chien mountain; exactly 135°; 5 watches; make K'un-sung [*read P'i-sung*] island ---; steer 127½°; 5 watches; make Chi-li-mên mountain".[176]

(10) "Mien hua island [Bukit Jugra]; 24 fathoms of water --- 127½°; 5 watches; make Chia Wu islands [Cape Rachado]; proceed and enter."[177]

(11) [From Melaka] "Set sail; steer 127½°; 5 watches; make Shê Chien mountain; take a sounding, 20 fathoms; 127½°; 3 watches; make K'un-sung [*read P'i-sung*] island --- take a sounding, 4–5 fathoms; 142½° and [then] exactly 150°; 5 watches; make Chi-li-wên mountain [*on the west side*]".[178]

(12) [From Melaka] "Start the journey; steer 127½°; 5 watches; make Shê chien island; steer 127½°; 3 watches; make K'un-sung [*read P'i-sung*] island; take a sounding, 13 fathoms --- steer 142½°; 3 watches; make Chi-li-wên."[179]

And for the westward journey:—

(13) "Chi-li-mên mountain; steer 322½°; 5 watches; the ship is abreast of K'un-sung [*read P'i-sung*] island; exactly 330°; 5 watches; the ship makes Chien island; 315°; 5 watches; make Wu islands; follow the mountains and navigate; make Mo-liu-chia."[180]

(14) "Chi-li-mên mountain; 322½°; 3 watches; make K'un-sung [*read P'i-sung*] island; take a sounding, 25 fathoms; exactly 315°; 5 watches; make Shê chien mountain; 307½°; 5 watches; make Wu islands; take a sounding, 25 fathoms; go forward to the mainland; 1 watch; approach Mo-liu-chia harbour."[181]

(15) "Set sail from Wu islands; exactly 315° and [then] 307½°; 5 watches; make Chia Wu islands; exactly 315°; 5 watches; make Mien hua island."[182]

(16) [*From the west side of Karimun islands*] "Chi-li-wên mountain; exactly 330°; 4 watches; make K'un-sung [*read P'i-sung*] island; --- take a sounding, 4-5 fathoms; exactly 330° [and then] 322½°; make Great and Little Shê chien mountains; exactly 315°; 5 watches; make Wu islands."[183]

(17) "Chi-li-wên; again exactly 315°; 3 watches; make K'un-sung [*read P'i-sung*] island; take a sounding, 13 fathoms; steer exactly 330°; 5 watches; make Great and Little Shê chien islands; steer 322½°; 5 watches; make Wu islands; follow the mountains and navigate; [here] is Ma-liu-chia."[184]

(18) "Chi-li-wên mountain; take a sounding, 27 fathoms; --- steer 322½°; 3 watches; make K'un-sung [*read P'i-sung*] island. K'un-sung [*read P'i-sung*] island; take a sounding, 25 fathoms; steer exactly 330°; 5 watches; make Chien island. Chien island; take a sounding, 34 fathoms; steer 307½°; 5 watches; make Wu islands.

Wu islands; in former times a chief established a market on these [islands]; among these [islands] there are the Chên Wu islands ['True Five islands'] and the Chia Wu islands ['False Five Islands']; follow the mountains and enter; [here] is Ma-liu-chia."[185]

Bearings

The Arab directions are inadequate because they make no attempt to name land-marks. The Arab navigator is directed to proceed towards Bukit Jugra on a

bearing of 112½° until he sees Bukit Jugra in the NNE., and then he is to bear SE. until he reaches Melaka; under present conditions this would take him too far away from the mainland — about 16 miles from Tanjong Keling; but he would avoid this by following the direction to "follow the mainland to Malacca."

So, too, if he passed 5 miles from the Water islands when bound for Singapore strait, the bearing of 135° would take him to the west side, instead of to the east side, of the Karimun islands.

Tibbetts has noted that beyond Melaka the quality of the Arab descriptions deteriorates suddenly;[186] on the other hand the Chinese texts give very detailed instructions for this stage of the voyage.[187] The Chinese figure of 127½° is nearer the mark than the Arab figure of 135°; but the Chinese texts give no details for the voyage from Tanjong Keling or the Water islands to Melaka beyond the vague direction to "follow the mountains".

A 'reasonable' course runs from 2°39′ N.,101°20′E. (where Bukit Jugra is abeam) on a bearing of 125° to a point where Cape Rachado is brought abeam 5 miles away; then on a bearing of 121° to a point where Tanjong Keling is brought abeam 5 miles away; then on a bearing of 71° to Melaka; then from Melaka on a bearing of 170° to a point where Pulau Undan (in the Water islands) bears 37°, being 5 miles away; then on a bearing of 117½° to a point where Bukit Banang is brought abeam 10 miles away; then on a bearing of 132° to a point where Pulau Pisang is brought abeam 6 miles away; then on a bearing of 123° to a point (1°13′ N., 103° 26′ E.) where Little Karimun is brought abeam 4 miles away.

Identifications

The names of Malacca, Pulau Pisang, and Karimun need no explanation. Sanya Usang represents the 'Sanghyang hujung' ('Holy Head') of the *Nagarakrtagama*, corrupted into the modern 'Sungei Ujong'.[188]

Wên lu ku must be the present-day Lukut, although the first syllable cannot be explained; perhaps the name originally took some such form as 'Melukut' or 'Berlukut'.[189] Cape Madura is stated in an Arab text to be called 'Sima in the language of India', and is placed in the 24 miles between 'Sanya Usang' and Melaka; Tibbetts identifies it with Cape Rachado.[190]

Chia Wu islands, 'False Five Islands', was the name given by the Chinese to Cape Rachado (Tanjong Tuan) presumably because at a distance the general aspect of the locality was considered to bear some resemblance to Five Islands, the old Chinese name for Melaka.[191]

Pulau Ubi is Pulau Upeh; it is stated to be 'to your left' and 'nearest the shore' of the four islands 'Pulau Mal'aqa, Pulau Sabta and their fellows' which the Arab navigator saw when approaching Melaka from the north. Pulau Mal'aqa is the modern Pulau Jawa, and we provisionally identify Pulau Sabta with the modern Pulau Panjang.[192] See Addendum A. Wu islands, 'Five Islands', were the Water islands.[193]

Shê chien mountain ('Shoot arrows mountain'), is shown by the sailing directions to be somewhat more than half way from Melaka to Pulau Pisang, and may with reasonable certainty be identified with Bukit Banang, 1407 feet, the highest mountain in this part of the coast; it is sometimes called Great and Little Shê chien mountains,

and sometimes merely Chien island.[194]

P'ing islets, 'Equal islets', were the similar islets named Pulau Iju Besar and Pulau Iju Kechil, 2½ miles north-west of Little Karimun; each is 146 feet high.[195]

Views may be seen in 'Pilot' No. 44, pages 424 to 426.

Bukit Jugra to Little Karimun

TABLE V

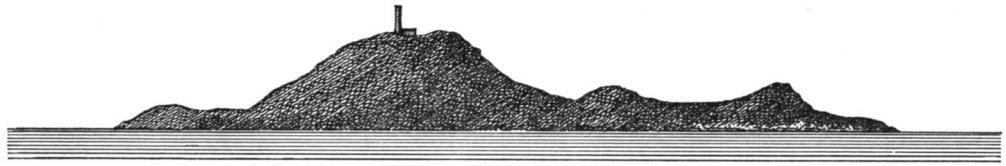
	Arab course	Chinese course	'Reasonable' course	Time (watches & hours)	Approximate distance (miles)	Speed (knots)
Bukit Jugra to Melaka	135°	127½°,	125°, then 121°, then 71°	10 / 24	62	2.5
Melaka to Water islands	—	—	170°	2 / 4.8 [*estimated*]	13	2.7
Water islands to Bukit Banang	135°	127½°	117½°	5 / 12	40	3.3
Bukit Banang to Pulau Pisang	135°	127½°	132°	3 / 7.2	25	3.4
Pulau Pisang to Little Karimun	135°	127½°	123°	3 / 7.2	19	2.6
				— —	—	
				23 / 55.2	159	
					Average	2.8

Singapore Strait

TABLE VI

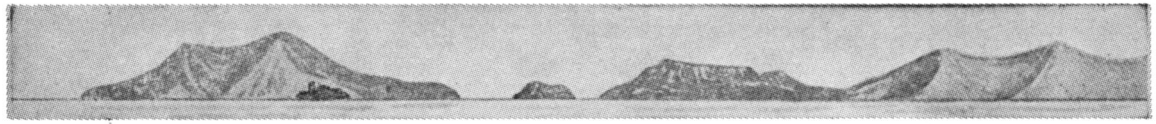
Arab name	Chinese name	Altitude of al-Farqadan & corrected latitude	True latitude	Modern name
Karimun[25]	Chi-li-mên*(21)*	5¾ f. 1°30′N.	c.1°08′N.	Karimun islands
	Tan-ma-hsi strait*(22)*		c.1°14′N.	Selat Sinki
	Sha-t'ang shoals*(23)*		1°09′N.	Pulau Nipa
	Ch'ang yao island*(24)*		1°09′N.	Pulau Satumu

[32] (*page 187*)



Pulau Pisang lighthouse, bearing 096°, 12 miles.
(*Original dated* 1942.)

[33] (*page 188*)



Little Karimun
The Brothers.

Great Karimun.

The Brothers and Karimun islands from north-westward.
(*Original dated prior to* 1924.)

Plate 6

(c) Pulau Pisang lighthouse
(d) The Brothers and Karimun islands from north-westward
Reproduced by permission of the Controller of Her Brittanic Majesty's Stationery Office, London.

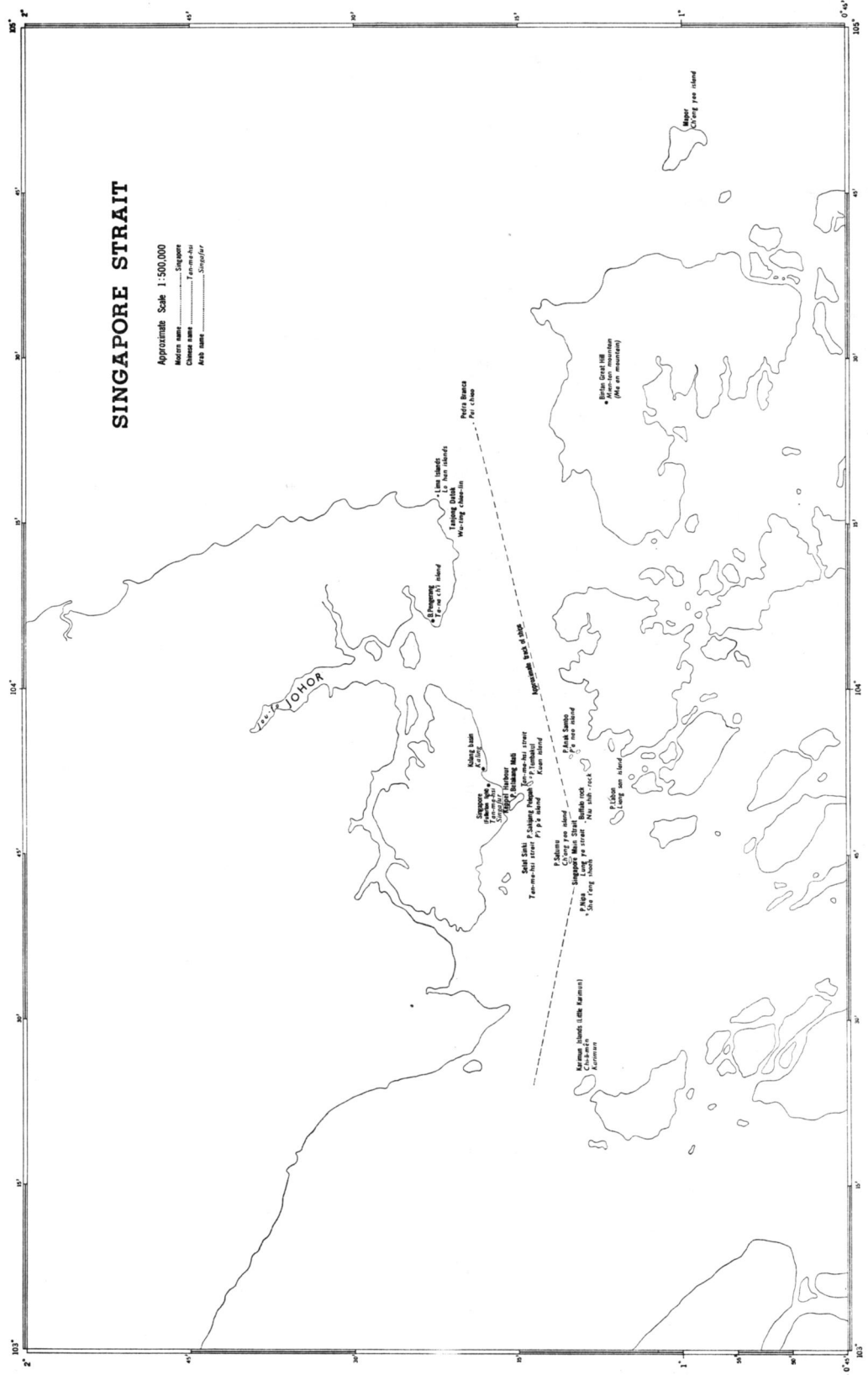


Fig.2. Map of Singapore Strait

[TABLE VI (Continued)]

Arab name	Chinese name	Altitude of al-Farqadan & corrected latitude	True latitude	Modern name
	Lung ya strait(25)		c.1°09′N.	Singapore Main strait
	Liang san island(26)		1°05′N.	Pulau Labon
	Niu shih rock(27)		1°09′N.	Buffalo rock
	P'i p'a island(28)		c.1°13′N.	Pulau Sakijang Pelepah
	Kuan island(29)		1°13′N.	Pulau Tembakul
	P'a nao island(30)		1°10′N.	Pulau Anak Sambo
Singapur [*Singafur*][26]	Tan-ma-hsi(31)	5f. 0°18′N.	c.1°17′N.	Singapore [Singapura]
Kaling[27]		5¼ f. 2°42′N.	1°18′N.	Kalang
	Ta-na ch'i island(32)		1°22′N.	Bukit Pengerang
	Wu-ting Chiao-lin(33)		1°22′N.	Johor (Tanjong Datok)
	Lo han islands(34)		c.1°21′N.	Lima islands
	Pai chiao(35)		1°20′N.	Pedra Branca
	Ma an mountain(36)		1°04′N.	Bintan Great Hill

See British Admiralty charts 3833 and 2403, and 'Pilot', No. 44.

Sailing directions

Arab.

The Arab texts give no sailing directions for Singapore strait. They mention only three names, Kaling, Singapur, and Lakanji (or Lagandji); we ignore the last, taking it to refer to Lagundi (Lagudri) on the island of Nias off the west coast of Sumatra.

Chinese.

For the eastward journey:—

(1) "[From] Chi-li-mên [Karimun islands], for 5 watches the ship steers 112½° and [then] exactly 120°, makes Ch'ang yao island, and goes out through Lung ya strait. From Lung ya strait, steering 82½° for 5 watches, the ship makes Pai chiao [Pedra Branca]".[196]

(2) "---Chi-li-mên mountain; follow the mountains and proceed; on the north side [there is] a tail of land, be on your guard [against it]; [steer] exactly 120° and [then] 112½°; after 2 watches you make Ch'ang yao island; you cannot travel [on the] south [side]; be apprehensive about fouling Liang san rock and Sha t'ang shoals; go out [through] Lung ya strait --- steer exactly 90°; make Kuan island; avoid the north [*read* '*south*'] side and Niu shih rock; steer 82½°; after 5 watches the ship makes Pai chiao [Pedra Branca]; navigate the ship past the north side [of it]; take a sounding, 15 fathoms; that is the correct route; avoid, on the north side, the Lo han islands [Lima islands] where there are rocks; take a sounding, 6–7 fathoms; that is the correct route; you must avoid the rocks and shallows; then go out through the strait; when you have left Pai chiao far behind, steer 22½°, [and after] 10 watches the ship is level with Ch'u-p'an mountain [Pulau Tioman]."[197]

(3) "--- Chi-li-mên mountain --- steer 112½°; after 3 watches make Tan-ma-hsi strait and [then] Ch'ang yao island; avoid the south side [and] Liang san rock and Sha t'ang shoals; go out [through] Lung ya strait; on the south side you have Niu shih rock --- steer 112½°; after 5 watches you make Lo han islands; [on the south?] side you have Pai chiao; you can pass through the middle of the strait; avoid, on the north, a tail of land and shallows; take a sounding, 8–9 fathoms; [that is the] correct route; [steer] 7½° and exactly 15°; after 3 watches you make Huo shao mountain [Pulau Lima Besar?] and Chiang chün mao [Pulau Tinggi]."[198]

(4) [From Wu-ting Chiao-lin, Johor] "Leave the harbour; steer 112½°; navigate out to the Lo han islands on their north side; steer exactly 15° and [then] 22½°; after 11 watches make Ch'u-p'an mountain."[199]

(5) "--- make Chi-li-wên. In front on the north side [is] a tail of land which must be avoided. Steer exactly 120° and [then] 112½°; after 3 watches you make Ch'ang yao island. Carefully avoid passing along the south side [of the strait]. You should travel on the north side [of the strait] as the ship passes [through]. Take a sounding, 14 fathoms. Again, avoid the north side [and] Lo han islands; on the north side there are rocks. Take a sounding, 17–18 fathoms; [that is the] correct route; take a sounding and go out through the strait; you must avoid Pai Chiao island."[200]

For the westward journey:—

(6) [*Note on Pai chiao*] "See Ch'ang yao island. On the inside pass Tan-ma-hsi strait. [Here] again there is an anchorage over against the rocks. [And here] you make a change of ship."[201]

(7) [*Note on Tan-ma-hsi strait*] "Take a sounding, 30 fathoms. You cannot navigate the ship at night."[201]

(8) [*Note on Ch'ang yao island*] "Take a sounding, 30 fathoms. [In] Lung ya strait avoid the south side [and] Liang san rock; it is the north side which is the correct route. [Sounding,] 20 fathoms."[201]

(9) [*Note on Lung ya strait*] "In the middle there are 30 fathoms. You see Ch'ang sha shoal. On the north side, 20 fathoms; on the south side, 8 or 9 fathoms."[201]

(10) [*Note on Niu shih rock*] "Carefully enter the strait. You see Ch'ang yao island. More than 20 fathoms of water. Avoid the south side."[201]

(11) [*Note on Liang san rock*]" On the north side is the correct route. Take a sounding, 29 fathoms."[201]

(12) "The ship makes Pai chiao and Pei and Nan An [Bintan Little Hill and Bintan Great Hill] and Lo han islands; the ship passes with Pai chiao on the sail-spread side [port]; steer exactly 270°; after 5 watches the ship makes Lung ya strait --- avoid the south side [where] you have Niu shih rock; you pass [through] the strait; [when] level with Ch'ang yao island, avoid the south side [where there are] sandy shoals and Liang san rock. Steer 292½°; after 3 watches the ship makes Chi-li-mên mountain. Steer 322½°; after 5 watches the ship is level with K'un-sung [*read P'i-sung*] island."[202]

(13) "See Tung Hsi Chu [Pulau Aur] and Chiang chün mao [Pulau Tinggi] and Hua shao mountain [Pulau Lima Besar?] and Chu mu mountain [Pulau Lima Kechil?], all on the outside; [steer] 172½°; after 7 watches you make Lo han islands; there are shallows; take care; on the shallows take a sounding, 8–9 fathoms; going and coming, you must look out for Pai chiao as a guiding mark; take a sounding, 15 fathoms; there are rocks on the sail-spread side [port]; on the horse-door side [starboard], too, you cannot come close to the island; avoid the shallows; take a sounding, 8-9 fathoms; [that is the] correct route; steer 262½°; after 5 watches you enter Lung ya strait --- after you have emerged from the strait you again pass Tan-ma-hsi strait. Steering 262½° and [then] 292½°, after 3 watches you make Chi-li-mên mountain."[203]

(14) "Chiang chün mao --- steer exactly 195° --- navigate to the Lo han islands --- close in to Wu-ting Chiao-lin on the north side."[204]

(15) "Make Pai chiao and Ma an mountain [Bintan Great hill] and Lo han islands. Pass by Pai chiao [leaving it] on the outside; steer exactly 270°; after 5 watches you make Lung ya strait --- be sure to avoid the south side [where] you have Pan ch'uang [*Niu shih*?] rock.[205] [Here] is Ch'ang yao island; [here] also avoid the south side [where] you have Sha t'ang [shoals] and Liang san rock. Steer 292½°; after 3 watches [you reach] Chi-li-wên."[206]

(16) "Lo han islands. Going and coming seek Pai chiao as a leading mark. Going to Man-la-chia follow the north side for your ship to pass. Steer 262½°; after 5 watches you enter Lung ya strait.

Lung ya strait. Nowadays, at night, the people in the *po* ships do not dare to travel [here] because of the multitude of robbers. And on the south there is the Liang san rock. In the middle take a sounding, 30 fathoms; on the north, 20 fathoms; on the south, 8 or 9 fathoms. Again, you pass Tan-ma-hsi strait. Steer 262½° and [then] 292½°; after 3 watches you make Chi-li-wên mountain."[207]

Bearings

If we presume that the Chinese ships on the eastward journey passed at an equal distance from Pulau Pisang and the Karimun islands, and that they changed course when abeam of Little Karimun, then the point of the change would be 1°10′12″N., 103°26′24″E.

Thence they steered 120° and then 112½°, that is, south of due east,[208] to Ch'ang yao island and Lung ya strait. They reached Ch'ang yao island after a voyage of from 2 to 5 watches. In the immediate vicinity of Ch'ang yao island they passed through Lung ya strait and changed course to 90°; at Kuan island they changed course to 82½° and passed out through Singapore strait between the Lo han islands [Lima islands] on the north and Pai chiao [Pedra Branca] on the south, after a voyage of 5 watches to a point about 1½ miles north of Pai chiao, that is, 1°19′48″N., 104°24′20″E.

On the westward journey, ships from Pai chiao steered 270° or 262½° to Lung ya strait; and from Lung ya strait they steered 262½° and then 292½°, or from Ch'ang yao island they steered 292½°, to the Karimun islands.

Under present-day conditions the courses specified in the Chinese texts would be unsatisfactory because they would take the ship too far to the south; on the course from the Karimun islands to Lung ya strait the ship would foul Pulau Nipa, and on the course from Lung ya strait it would foul Batu Berhanti and Pulau Anak Sambo.

So, too, in the opposite direction; on a course of 262½° from a point 1½ miles north of Pedra Branca the ship would travel to a point north of St John islands, and on a course of 262½° from a point half a mile south of Pulau Satumu the ship would foul Pulau Nipa.

Presumably the helmsman was expected to see the dangers, and, in the words of the 'Pilot', to pass them "at a prudent distance".

In modern times ships travel down the middle of the fairway between Little Karimun and Tanjong Piai,[209] that is, to about 1°13′N., 103°26′E., and thence a 'reasonable' course is 102° to a point half a mile south of Pulau Satumu, then 65° to a point half a mile south of Pulau Sakijang Bandera, then 75° to a point 1½ miles north of Pedra Branca.

Identifications.

There can be no doubt about the termini in Singapore strait; at the western end it was entered near Chi-limên, the Karimun islands, and at the eastern end near Pai chiao, 'White Rock', Pedra Branca, Horsbrugh light. The route ran close to Ch'ang yao, 'Long Waist', island, and through Lung ya, 'Dragon Tooth', strait.

On the evidence, only two routes are reasonably possible, namely,

(a) a route through Keppel Harbour, running allegedly north of Ch'ang yao island; and

(b) a route running south of Pulau Satumu, Raffles light.

In considering these two routes, the present writer formed the conclusion that the former route was impossible for the following six reasons:—

(1) Text (10) above represents that Ch'ang yao island was sighted at the moment when, or at some time after, the ship entered Lung ya strait, whereas if Lung ya strait had been Keppel Harbour bounded on the south by Ch'ang yao island, allegedly Pulau Belakang Mati, it would have been readily visible for at least one hour before the ship entered Lung ya strait, since Mount Serapong, at the north-eastern end of Pulau Blakang Mati, is 292 feet high;

(2) In several Chinese texts the navigator is instructed to sail on the north side of the fairway through Lung ya strait, whereas in proceeding east through Keppel Harbour the navigator had to sail first on the south side of the passage, then in the

middle or nearer to the north side, and finally turn to the south-east;[210]

(3) Several Chinese texts represent that the required course lay south of Ch'ang yao island, whereas if Lung ya strait had been Keppel Harbour bounded on the south by Ch'ang yao island, the course would lie north of Ch'ang yao island;

(4) Two Chinese texts represent that on the north side of the course through Lung ya strait there lay another strait called Tan-ma-hsi [Singapore] strait, whereas if Lung ya strait were Keppel Harbour, no reasonably possible strait exists in this vicinity;

(5) The drawing on the Mao K'un map[211] and text (2) show that on the north side of the course from Lung ya strait to Pedra Branca there lay an island called Kuan island, whereas if Lung ya strait were Keppel Harbour, no island exists on the north side of the course;

(6) It is impossible to contemplate that the course taken by Chinese merchant ships would ordinarily lie through Keppel Harbour, which was a narrow land-locked passage infested by pirates.[212]

The present writer also formed the conclusion that the Keppel Harbour route was improbable for the two following reasons:—

(i) It is unlikely that Keppel Harbour contained a depth of 30 fathoms as mentioned in the Chinese texts; *inter alia*, in 1637 Weddell found only 4½ fathoms a ship's length from him;[213]

(ii) The figures for the courses to be steered are somewhat less favourable to the identification of Lung ya strait with Keppel Harbour[214]; *inter alia*, if the navigator on emerging from Lung ya strait, allegedly Keppel Harbour, had steered 292½° as directed in text (15), he would have grounded his ship on Singapore island.

If the route through Keppel Harbour has to be rejected, it should logically follow that the route south of Pulau Satumu was the route specified in the Chinese texts.

It is possible to draw confirmatory or additional conclusions from the facts stated in the texts; thus,

(a) since east-bound and west-bound ships changed to a more northerly course at Ch'ang yao island, this island must have been the most southerly island which they made;

(b) since Liang san island (or rock) lay to the south of both Ch'ang yao island and Lung ya strait, this strait and island must have been fairly close together;

(c) since Ch'ang yao island was not one of the dangers on the south side of the course through Lung ya strait, it must have lain on the north side of the course;

(d) since the times of travelling from and to Karimun islands are normally given to and from Ch'ang yao island, and since the times of travelling from and to Pedra Branca are always given to and from Lung ya strait, this strait in all probability extended further to the east than Ch'ang yao island;

(e) since the time taken in travelling between Karimun islands and Ch'ang yao island averaged 3¼ watches and the time taken in travelling between Lung ya strait and Pedra Branca was 5 watches, Ch'ang yao island in all probability lay west of Lung ya strait;

(f) since the dangers to the south of Ch'ang yao island were Sha t'ang shoals and Liang san island (or rock), and the dangers to the south of Lung ya strait were

Liang san island and Niu shih rock, and since the entrance to Lung ya strait probably lay further east than Ch'ang yao island, Niu shih rock probably lay further east than Liang san island;

(g) many texts warn the navigator against dangers lying to the south of the course in the vicinity of Ch'ang yao island and Lung ya strait, and instruct him to keep to the north side of Lung ya strait;

(h) since the time taken in travelling from Kuan island to Pedra Branca was 5 watches, and the time taken in travelling between Lung ya strait and Pedra Branca was also 5 watches, Kuan island must have lain not far from Lung ya strait;

(i) one end of Tan-ma-hsi strait lay to the north of the course between Pai chiao [Pedra Branca] and Ch'ang yao island, and the other end of Tan-ma-hsi strait was passed by a ship proceeding from Ch'ang yao island to Chi-li-mên [Karimun islands];

(j) at the eastern end of Singapore strait, the course lay in mid-channel on the north side of Pai chiao [Pedra Branca] and on the south side of Lo han islands [Lima islands];

(k) Wu-ting Chiao-lin was situated to the north-west of Lo han islands;

(l) Ma an mountain, together with Pai chiao [Pedra Branca] and Lo han islands [Lima islands] was reached by a ship entering Singapore strait from the east.

The nautical manuals do not mention Tan-ma-hsi, P'i p'a island, Pa-nao island, or Ta-na-ch'i island.

The sketch of the strait in the Mao K'un map shows the course and the approximate position of the various places.[215] Here it is represented that after the ship entered Singapore strait from the Karimun islands it first passed Sha t'ang shoals on the south side of the ship, then sailed between Ch'ang yao island on the north side of the ship and Liang san island and Niu shih rock on the south side of the ship, then travelled between Pa-nao island on the south side of the ship and P'i p'a island on the north side of the ship, with Tan-ma-hsi [Singapore] due north of P'i p'a island, then passed between Ma an mountain on the south side of the ship and Kuan island on the north side of the ship, with Ta-na-ch'i island further north on the mainland, and finally emerged from the strait north of Pai chiao [Pedra Branca].

The Mao K'un map does not mention Tan-ma-hsi strait, Kaling, Wu-ting Chiao-lin, or Lo han islands, and it writes the name 'Lung ya mên' on an island about half-way between Pedra Branca and Bangka, probably owing to a confusion with Lingga island.

Supplied with the above information, one may attempt the identification of the places named in the texts.

Chi-li-mên, 'Karimun', is presumably the highest island of the Karimun group, that is, Little Karimun, which rises to 1,237 feet.

One end of Tan-ma-hsi strait was passed as the ship travelled between Lung ya strait and the Karimun islands, and the other end of Tan-ma-hsi strait lay on the north side of the course as the ship travelled between Pedra Branca and Lung ya strait. We therefore identify the western portion of Tan-ma-hsi strait with Selat Sinki, while the eastern portion of Tan-ma-hsi strait may be either the passage through Keppel Harbour north of Pulau Belakang Mati, or the passage immediately south of Pulau

Belakang Mati.

Sha t'ang shoals, 'Granulated sugar shoals', being the first danger on the south side of the course from the Karimun islands, must be Pulau Nipa reef.

Ch'ang yao island lay on the north side of the course, having Liang san island and Niu shih rock on the south side of the course: Liang san island, 'Parasol island', is Pulau Labon (Little Ganymede) on the south side of Singapore Main strait; it has a bare conical hill, 95 feet high, and the Chinese in modern times call it Parasol island: Niu shih chiao, 'Buffalo Dung rock', is Buffalo rock, in modern times called by the Chinese Buffalo Dung rock and by the Malays Batu Kerbau, 'Buffalo rock', or Batu Hitam, 'Black rock': therefore, Ch'ang yao island is Pulau Satumu on the north side of Singapore Main strait.[216]

Lung ya strait, 'Dragon teeth strait', was entered from the east between Buffalo rock and Pulau Satumu, Raffles light; the strait lay between Pulau Satumu on the north side and the dangers on the south side, namely, Buffalo rock, Pulau Pemping Besar, Pulau Labon, Pulau Pelampong, and Pulau Nipa.[217]

P'i p'a island lay nearly due south of Tan-ma-hsi [Singapore] and west of Kuan island: Kuan island, called 'Official island' probably because an officer of the Shah-bandar or Port Officer was stationed there, was 5 watches' sailing from Pedra Branca; ships proceeding eastward were said to change course here from 90° to 82½°, and the texts represent that it was the first danger encountered by ships proceeding westward; hence we identify it with Pulau Tembakul, 87 feet high, which is the first danger encountered by ships proceeding westward from the channel north-west of Pedra Branca on a bearing of 255°.

P'i p'a island, lying on the west of Kuan island, we identify with Pulau Sakijang Pelepah, lying on the west side of Pulau Tembakul; the Chinese name 'P'i p'a' may be a corruption of the Malay 'Pelepah'. P'a nao island was not regarded as a danger and therefore must have lain some distance from the course; it is the most easterly of the islands marked in this part of the strait; we identify it with Pulau Anak Sambo, the most northerly, the most easterly, and the highest (100 feet) of the islands nearest to the course on the south side; the name must be a transliteration of a Malay word, perhaps *perahu* (*prao*, etc.).

Tan-ma-hsi undoubtedly represents 'Tamasek', the old Malay and Javanese name for Singapore; it so appears in the *Nagarakrtagama* of 1365 and also in the *Sejarah Melayu* of about 1536, but the Arab name 'Singapur' shows that 'Singapura' was used by 1490.

Kaling, which the Arab text locates at some 12 miles north of Singapore, we identify with Kalang, about 1 mile further north then the mouth of Singapore river; Kalang basin, being protected from the sea by Tanjong Rhu, is nowadays much frequented by local shipping, and probably was so in 1500.

Ta-na-ch'i island is placed on the mainland in the Mao K'un map; Ta-na is an abbreviation of the Malay name 'Ujong Tanah', 'Land's end', applied to Johor, and 'Ta-na river island' thus denotes 'Johor river island'; we identify this with Bukit Pengerang or Johor hill, a conspicuous hill half a mile from the eastern shore of Sungei Johor. Wu-ting Chiao-lin perhaps represents another Chinese attempt to transliterate the Malay name 'Ujong Tanah'; the place was situated a short distance

west-north-west from the Lo han islands; these islands lay on the north side of the course running out of Singapore strait on the north side of Pedra Branca; we therefore identify them with the Lima islands: since Chinese ships sailed from a haven on a bearing of 112½° to the north side of the Lima islands, this haven must have been situated near Tanjong Datok, 1°22′N.

Pai chiao, 'White rock', undoubtedly signifies the rock called by the Portuguese and by modern geographers 'Pedra Branca', lying in the middle of the eastern entrance to Singapore strait, and carrying Horsburgh light.[218]

Ma an mountain, 'Horse saddle mountain', is stated to be a land-mark, together with the Lima islands and Pedra Branca, for ships approaching the eastern entrance of Singapore strait; it was also a land-mark for ships running north from Djakarta to China;[219] we therefore identify it with Bintan Great Hill, which from northward shows a saddle-shaped summit: one text refers to 'Pei and Nan An', 'North and South Saddles', that is, Bintan Little Hill and Bintan Great Hill.

Since, apart from a few obvious errors, the Chinese texts are fairly consistent on essential points, the present writer has considered it incumbent on him to follow them. Those who identify Lung ya strait with Keppel Harbour in effect reject the Chinese evidence in at least three respects; (1) they deny that Ch'ang yao island lay on the north side of Lung ya strait, (2) they deny that it was advisable to travel along the north side of Lung ya strait, (3) they deny that on the north side of the course between Lung ya strait and Pedra Branca there lay two islands called P'i p'a island and Kuan island.[220]

Views may be seen in 'Pilot', No. 44, pages 426–427.

Karimun islands to Pedra Branca

TABLE VII

	Chinese course	'Reasonable' course	Time (watches & hours)	Approximate distance (miles)	Speed (knots)
Karimun islands to Lung ya strait	112½°, then 120°	102°	3 / 7.2	16	2.2
Lung ya strait to Pedra Branca	90°, then 82½°	65°, then 75°	5 / 12.0	41	3.4
			— —	—	
			8 / 19.2	57	
				Average	2.9

The east coast of the Malay Peninsula

TABLE VIII

Arab name	Chinese name	Altitude of al-Farqadan & corrected latitude	True latitude	Modern name
	Mien-tan(37)		1°04′N.	Bintan Great Hill
	Pai chiao(35)		1°19′N.	Pedra Branca
	Hai mountain(38)		2°13′N.	Pulau Sibu?
	Huo shao mountain(39)		2°13′N.	Pulau Lima Besar?
	Chu mu(40)		2°13′N.	Pulau Lima Kechil?
Tinggi[28]	Chiang chün mao(41)	5 f. 0°18′N.	2°18′N.	Pulau Tinggi
	Tung Hsi Chu mountains(42)		2°26′N.	Pulau Aur
	Shih rock(43)		2°41′N.	Pulau Sribuat [Seri Buat]
	Shih tao mountain(44)		c.2°43′N.	[*on Pulau Tioman*]
	Ch'u-ma mountain(45)		2°46′N.	Pulau Tioman
Pang Patik[29]	P'êng-hang haven(46)	7 f. 3°30′N.	3°31′N.	Sungei Pahang estuary
	T'ieh chên island(47)		4°03′N.	Pulau Ular?
	Ta tsao ch'uan mountain(48)		4°06′N.	Bukit Panjang?
	Tou island(49)		4°49′N.	Pulau Tenggol [Tung-gal]
	Mien hua island(50)		5°12′N.	Pulau Kapas
	Ting-chia-lu(51)		5°20′N.	Terengganu
	Chüeh yüan(52)		5°37′N.	Pulau Bidong Laut

[TABLE VIII (Continued)]

Arab name	Chinese name	Altitude of al-Farqadan & corrected latitude	True latitude	Modern name
	Shih yüan island*(53)*		5°41′N.	Pulau Chipu
	Yang island*(54)*		5°48′N.	Pulau Lang Tengah
	Shih mountain*(55)*		5°49′N.	Pulau Rhu
	San chüeh island*(56)*		5°53′N.	Pulau Perhentian Besar
	Yen tun island*(57)*		5°57′N.	Pulau Susu Dara
Kalandan[30]	Chi-lan-tan haven*(58)*	8 f. 5°06′N.	6°11′N.	Sungei Kelantan estuary

See British Admiralty charts 3543, 2660A, and 2414, and 'Pilot', No. 30.

Sailing directions

Arab.

The Arab texts give only one bearing, namely, from Singapur [Singapore] to Banagh as 348°45′[221]. At Banagh the altitude of Polaris was 4 fingers[222] [corrected equivalent 9°55′N.]; we provisionally identify it with Ko Phangan, 9°43′N.

Apart from that, they give only 3 place-names with corresponding altitudes of al-Farqadan, namely, Tinggi [Pulau Tinggi] with 5 fingers, Pang Patik [Pahang] with 7 fingers, and Kalandan [Kelantan] with 8 fingers.[223]

Chinese.

(1) "After passing Pai chiao [Pedra Branca] steer 22½° and [then] exactly 15°. After 5 watches the ship is level with Tung Chu mountain [Pulau Aur], and passes outside it. After passing Tung Chu mountain, steer 7½° [*reading "0°-15°" for "0°-30°"*] and [then] exactly 15°; the ship makes K'un lun mountain [Grande Condore] and passes outside it".[224]

(2) [*Note on Chiang chün mao, Pulau Tinggi*]
"On the south is the "Hat band", that is, Huo shao island mountain [Pulau Lima Besar?] and Hai mountain [Pulau Sibu ?]".[225]

(3) [*Note on Huo shao mountain, Pulau Lima Besar* ?]
"Chu mu mountain [Pulau Lima Kechil ?] is connected with it".[225]

(4) [*Note on Tou island, Pulau Tenggol*]
"The ship passes on the east side; 5 watches' sailing; [here] is P'êng-fang [Pahang] harbour".[226]

(5) [*Note on T'ieh chên island, Pulau Ular* ?]
"Tou island [Pulau Tenggol] is in sight".[226]

(6) [*Note on Ta tsao ch'uan mountain, Bukit Panjang* ?]
"T'ieh chên island [Pulau Ular ?] is opposite to this mountain".[226]

(7) [*Note on Pêng-hêng* [*Pahang*] *harbour*]
"In an area on the south-east side is Ch'u-p'an mountain [Pulau Tioman]".[226]

(8) "--- K'un-lun mountain [Grande Condore]; pass outside it; steer 232½° and [then] 262½°; 30 watches; the ship makes Chi-lan-tan [Kelantan] harbour. Steer exactly 240°; 7 watches; the ship [makes] Liu-k'un [Ligor, Nahkon] --- Ta-ni [Patani]".[227]

[*But the return journey was made direct from Pattani to Grande Condore without touching Kelantan*]

(9) "---K'un-lun [Grande Condore] mountain; steer 217½°; 40 watches; the ship makes P'êng-fang [Pahang] harbour".[228]

(10) "Pêng-fang [Pahang] harbour --- steer 52½°; 6 watches; the ship makes Mien hua island [Pulau Kapas]; steer exactly 45°; 7 watches; again steer 45° and [then] 37½°; 6 watches; the ship steers exactly 30° and [then] 22½°; 20 watches; the ship makes K'un-lun mountain [Grande Condore]".[229]

(11) "---K'un-lun mountain [Grande Condore]; ---steer 202½°; 20 watches; the ship steers exactly 210°; 25 watches; the ship makes Ch'u-p'an mountain [Pulau Tioman] and Tung Hsi Chu [Pulau Aur] [and] Chiang chün mao [Pulau Tinggi]; in the distance, inside Chiang chün mao, you see Huo shao mountain [Pulau Lima Besar ?] also; [steer] 202½°; 15 watches; the ship makes Pai chiao [Pedra Branca], [and] Pei and Nan An [Bintan Little Hill and Bintan Great Hill] and the Lo han islands [Lima islands]; the ship passes Pai chiao on the sail-spread side [port]".[230]

(12) "---Pai chiao [Pedra Branca]; the ship travels past it on the north side; take a sounding, 15 fathoms, [that is] the correct route; avoid, on the north side, the Lo han islands [Lima islands], [where] there are rocks; take a sounding, 6–7 fathoms; [that is] the correct route; it is important to avoid the rocks and shallows; then pass out from the strait; when you have left Pai chiao [Pedra Branca] at a distance, steer 22½°; 10 watches; the ship is level with Ch'u-p'an mountain [Pulau Tioman]; beyond it is Tung Hsi Chu [Pulau Aur] on the east side; pass inside; steer 7½° and [then] 15°; 45 watches; the ship makes K'un-lun mountain [Grande Condore]".[231]

(13) "Ch'u-p'an mountain [Pulau Tioman]; ---steer 172½°; pass Tung Hsi Chu mountain [Pulau Aur]; steer 172½°; 10 watches; make Ch'ang island [Mapor]".[231]

(14) "---K'un-lun [Grande Condore] --- steer 217½° and [then] exactly 210°; 30 watches; make Tou island [Pulau Tenggol]; steer 187½°; 5 watches; enter the haven [P'êng-hêng, Pahang]".[232]

(15) [From Pêng-hêng, Pahang] "Set sail from the harbour; steer 52½°; 6 watches; make Tou island [Pulau Tenggol] [and] Mien hua island [Pulau Kapas]; steer 52½°; 7 watches; steer 37½°; 6 watches; exactly 30°; 20 watches; make K'un-lun [Grande Condore]".[233]

(16) "---Chi-lan-tan [Kelantan] harbour; [steer] 172½°; 4 watches; make San chüeh island [Pulau Perhentian Besar]; in the inner strait there is a large mountain appearing right ahead; it is called Chüeh yüan mountain [Pulau Bidong Laut]; you can pass outside or inside; [steer] exactly 180°; 3 watches; make Mien hua island [Pulau Kapas]; [steer] exactly 180°; 5 watches; make Tou island [Pulau Tenggol];

[steer] exactly 180°; 5 watches; make P'êng-hêng [Pahang] harbour; [steer] exactly 180°; 5 watches; make Ch'u-p'an mountain [Pulau Tioman]; small ships can pass along the inner passage; large ships pass on the outside; proceeding, you see Tung Hsi Chu [Pulau Aur] and Chiang chün mao [Pulau Tinggi] [and] Huo shao mountain [Pulau Lima Besar ?] and Chu mu mountain [Pulau Lima Kechil ?], all on the outside; [steer] 172½°; 7 watches; make the Lo han islands [Lima islands];---going and coming, you must look out for Pai chiao [Pedra Branca] as a leading mark".[234]

(17) "Set sail from Ch'u-p'an [Pulau Tioman]; [steer] 172½°; 5 watches; pass Tung Hsi Chu [Pulau Aur] [and] Chiang chün mao [Pulau Tinggi]; [here] are the "Hat Band" rocks; careful; [steer] 172½°; 4 watches; see Mien-tan mountain [Bintan Great Hill]".[235]

(18) "--- Ch'ang yao island [Mapor]; steer 352½° and [then] exactly 345°; 10 watches; make Shih-li Ma an mountain [Bintan Great Hill]; steer 352½°, [and then] 337½°; 2 watches; make Tung Hsi Chu [Pulau Aur]; in front of you goes Ch'u-p'an [Pulau Tioman]".[236]

(19) "---K'un-lun mountain [Grande Condore] ---; [steer] 202½°; 45 watches; make Ch'u-p'an [Pulau Tioman]; [steer] 157½°; pass Tung Hsi Chu [Pulau Aur]; [steer] 172½°; 10 watches; make Ch'ang yao island [Mapor]".[236]

(20) "Ta-ni [Pattani] ---; set sail from the harbour; [steer] 172½°; make San chüeh island [Pulau Perhentian Besar]; pass inside it; [steer] exactly 180°; 5 watches; make Mien hua island [Pulau Kapas]; [steer] 157½°; 5 watches; make Tou island [Pulau Tenggol]; [steer] exactly 180°; 5 watches; make Ti-p'an mountain [Pulau Tioman]; [steer] 112½°; 10 watches; make Ch'i islands [Pulau Tujoh]".[237]

(21) "Chiang chün mao [Pulau Tinggi]; steer 352½°; make Ch'u-p'an [Pulau Tioman]".[238]

(22) "--- Hsiao K'un-lun mountain [Les Deux Frères]; steer 202½°; 11 watches; steer exactly 210°; 15 watches; steer 217½°; 18 watches; make Ch'u-p'an mountain [Pulau Tioman] on the sail-spread side [port]; steer exactly 225°; haul in to Chiang chün mao [Pulau Tinggi]; --- inside you have the "Hat Band" --- steer exactly 195°; follow the land; navigate to the Lo han islands [Lima islands] ,--- close in to Wu-ting chiao-lin".[239]

(23) "--- K'un-lun [Grande Condore]; [steer] exactly 210° and [then] 202½°; 25 watches; [steer] exactly 210°; 24 watches; make Ti-p'an [Pulau Tioman]; steer 172½°; 3 watches; make Tung Chu [Pulau Aur]; steer 172½°; 10 watches; make Ch'ang yao [Mapor]".[240]

(24) "--- Ch'ang yao island [Mapor]; [steer] 352½°; 13 watches; make Ti-p'an [Pulau Tioman] on the inside; [steer] 352½°; make P'êng-hêng harbour [Pahang]; [steer] exactly 360°; 10 watches; make Tou island [Pulau Tenggol]; [steer] exactly 330°; 5 watches; make Mien hua [Pulau Kapas] and Yüan Kuang island [Pulau Bidong Laut]; the ship can pass both inside and outside; [steer] exactly 300°; you see 2 islands; you can approach them; you cannot approach the land side where there are shallows and stone-tablet rocks emerging from the water; when you have passed the strait, steer exactly 315°; 3 watches; make San Chüeh island [Pulau Perhentian Besar]; [steer] 337½°; 3 watches; [there is] a tail of land; [this] is the correct route;

[make ?] Chi-lan-tan harbour [Sungei Kelantan]; steer 292½°; 7 watches; follow the land and navigate; you see Liu-k'un hsia ch'ih ['Nakhon Lower Pool']; make Ta-ni [Pattani]."[241]

(25) "---level with Ch'ang yao island [Mapor]; and steer 352½°; 4 watches; in the evening see Tung Hsi Chu [Pulau Aur] under the sail; in the night steer 352½°; in the morning see Ti-p'an mountain [Pulau Tioman] ---". [*to Grande Condore*][242]

(26) "On the north-east of Ch'ang yao island [Mapor] ---; steer 352½°; in the evening level with Tung Chu [Pulau Aur] --- steer 352½°; in the morning level with Ti-p'an [Pulau Tioman] and Shih tao mountain [*on Pulau Tioman*] on the south-east side ---".[243] [*unfinished*]

(27) "--- K'un-lun [Grande Condore] ---; steer 217½° and [then] exactly 210°; 45 watches; make Ch'a-p'an [Pulau Tioman] and Tung Hsi Chu [Pulau Aur]; in the distance you see Chiang chün mao [Pulau Tinggi] on the inside and Huo shao mountain [Pulau Lima Besar ?]; steer 202½°; 10 watches; make Pai chiao [Pedra Branca] and Ma an mountain [Bintan Great Hill] and Lo han islands [Lima islands]".[244]

(28) "---Pai chiao island [Pedra Branca]; steer 330°, and [then] 352½°; 5 watches; make Ch'a-p'an [Pulau Tioman]; clear it in 1 watch; steer 7½°; 40 watches; take a sounding, 30 fathoms; see K'un-lun [Grande Condore]".[245]

(29) "--- K'un-lun [Grande Condore]; steer exactly 225° and [then] 232½°; 10 watches; steer exactly 240° and [then] 247½°; 18 watches; make Mien hua island [Pulau Kapas]; --- steer exactly 135°; 5 watches; level with Tou island [Pulau Tenggol]; steer exactly 150°; 8 watches; make Ti-p'an [Pulau Tioman]; pass on the outside; [steer] exactly 150°; 3 watches; make Tung Hsi Hsing [*read Chu*]; pass on the inside, steer exactly 165°; 11 watches; pass Ch'ang yao island [Mapor]".[246]

(30) [*Note on Hsi Chu mountain, Pulau Aur*]
"Hsi Chu mountain [Pulau Aur] also has the shape of a horse-saddle; the west side is low; inside you have Chiang chün mao [Pulau Tinggi], you have Huo shao t'a ['Fire burn tower', Pulau Lima Besar ?] and Chu mu [Pulau Lima Kechil ?] --- steer 172½°; 10 watches; make Ch'ang yao [Mapor]".[247]

(31) [*Note on Ch'ang yao island, Mapor*]
"Ch'ang yao island [Mapor]; steer 7½° and [then] 15°; 10 watches; make Tung Chu [Pulau Aur]".[247]

(32) "Again from K'un-lun mountain [Grande Condore]; steer 232½° and [then] 262½°; 30 watches; make Chi-lan-tan [Kelantan].

Chi-lan-tan [Kelantan]: this is Ta-ni [Pattani] harbour; steer 232½°; 7 watches; enter the haven; this is the country of Ta-ni [Pattani]. Again from K'un-lun mountain [Grande Condore]: steer 217½°; 30 watches; make Tou island [Pulau Tenggol].

Tou island [Pulau Tenggol]: steer 187½°; 5 watches; make the country of P'êng-hêng [Pahang].

The country of P'êng-hêng: one name for it is P'êng-k'êng; [steer] exactly 180°; 5 watches; make Ti-p'an mountain [Pulau Tioman].

Ti-p'an mountain [Pulau Tioman]: it is outside the P'êng-hêng [Pahang] haven; outside, take a sounding, 28 fathoms; inside, 44 fathoms; 3 watches; reach Tung Hsi Chu [Pulau Aur].

Tung Hsi Chu: this [is] the territorial boundary of Jou-fo [Johor]; steer 202½°;

10 watches; make Lo han islands [Lima islands]; this is Jou-fo [Johor] harbour.

The country of Jou-fo [Johor]: one name for it is Wu-ting Ch'iao-lin [Ujong Tanah]".[248]

There are a number of errors in the Chinese texts: for instance, text (10) wrongly states that ships steered 52½° [actually 9½° and then 315°] to get from Kuala Pahang to Pulau Kapas, and text (29) wrongly writes *hsing*, 'walk', for *chu*, 'bamboo'.

Bearings.

The Arab texts give nothing in the matter of adequate sailing instructions for ships proceeding eastwards from Singapore.

They merely state that the direction from Singapore to Banagh (perhaps Ko Phangan, 9°43′N.) was 348°15′N. The true course from Pedra Branca would be about 356°.

The Chinese texts, on the other hand, are replete with detail. Ships passing midway between the Lo han islands [Lima islands] and Pai chiao [Pedra Branca] would turn northwards when 1½ miles north of Pai chiao, that is, in 1°19′48″N., 104°24′20″E.

The voyage in the open sea presented no difficulties, since the navigator had a sufficient number of lofty islands and mountains to guide him, and for coastal shipping the only tricky piece of navigation was the passage between the mainland and the Redang and Perhentian groups of islands.

According to the Chinese texts, the through traffic from Pai chiao [Pedra Branca] would steer 22½° and then 15° till the ship made Tung Hsi Chu [Pulau Aur] after 5 watches; there it would change course to 7½° and then 15°, till it reached K'un-lun mountain [Grande Condore].

Nowadays, on the courses specified, Pulau Aur would be brought abeam at a distance of 13 miles, and the distance to this point from Pai chiao [Pedra Branca] would be about 66 miles, giving a speed of 5.5 knots; proceeding, the ship would reach a point about 30 miles west of Grande Condore; presumably it was considered safer to bear to the west of Grande Condore, since an additional land-mark was provided by Les Deux Frères (called Little K'un-lun by the Chinese), lying about 24 miles west of Grande Condore.

Alternatively, from Pai chiao [Pedra Branca] the ship steered 22½° till it brought Ch'u-p'an mountain [Pulau Tioman] abeam after 10 watches; there it would change course to 7½° and then 15°, till it reached K'un-lun mountain [Grande Condore] after 45 watches.

Nowadays, these prescribed courses would take the ship to a point where Ch'u-p'an mountain [Pulau Tioman] was brought abeam at a distance of 43 miles; the distance from Pai chiao [Pedra Branca] would be 74 miles and the speed 3 knots; for the rest, the prescribed courses would take the ship to a point about 3 miles east of Les Deux Frères; the distance would be about 380 miles and the speed 3.5 knots.

Alternatively again, through traffic might from P'êng-fang [Kuala Pahang] proceed to Mien hua island [Pulau Kapas], and thence, steering 45° for 7 watches, 45° and 37½° for 6 watches, and 30° and 22½° for 20 watches, make K'un-lun mountain [Grande Condore].

Sailing on these latter bearings would, under modern conditions, take the ship about 33 miles west of Les Deux Frères.

Another text, number (15), gives somewhat different bearings, namely, from Mien hua island [Pulau Kapas] 52½° for 7 watches, 37½° for 6 watches, and 30° for 20 watches; these courses would take the ship to a point about 18 miles west of Les Deux Frères.[249]

Coasting ships going north from Pedra Branca steered 330° and then 352½° as in text (28), and reached the west side of Pulau Tioman in 10 watches, as in text (12);[250] the distance would be about 85 miles and the speed 3.5 knots. None of the texts gives the bearing or the number of watches taken on the voyage from Pulau Tioman to P'êng-hêng [Kuala Pahang]; we estimate the number as 5 watches, since the journey in the opposite direction took 5 watches and ships travelled at about the same speed in both direction, as may be seen from texts (15) and (16) for the journey between Kuala Pahang and Pulau Tenggol.

From Pulau Tioman the bearing would be 330° and the distance about 59 miles.

From Kuala Pahang ships travelled due north, as in text (24), for 6 watches, as in text (15), to Tou island [Pulau Tenggol]; the bearing would be 11½° and the distance 74 miles if Pulau Tenggol was passed on the east side, as in text (4).

From Tou island [Pulau Tenggol] they sailed on a bearing of 330° for 5 watches, as in text (24), to Mien hua island [Pulau Kapas]; on the chart the bearing is 312½° if the island was passed on the east, and the distance 38 miles.

From Mien hua island [Pulau Kapas] ships travelled west of the Redang and Perhentian islands, as in text (24); first they reached Yüan kuang island, Pulau Bidong Laut; they then steered 300° and saw 2 islands, perhaps Pulau Redang and Pulau Lang Tengah; when they had passed the latter, they steered 315°, and (if we interpret the text correctly) after travelling for 3 watches from Pulau Bidong Laut, they made San chüeh island [Pulau Perhentian Besar]; whence they steered 337½° for 3 watches and reached the 'tail of land' at the entrance of Sungei Kelantan.

Text (24) is the only authority for the journey through the islands, and it fails to give all the necessary details.

If the above identifications are correct, then the bearings would be as follows:—

From Pulau Kapas to Pulau Bidong Laut; 315° [estimated]; 3 watches [estimated]; 27 miles

Thence to Pulau Perhentian Besar; 315° [actually 312°] 3 watches; 25 miles

Thence to Kuala Kelantan (abeam); 337½° [actually 317°]; 3 watches; 38 miles.

The Mao K'un map does not mark Pulau Kapas; and draws 4 islands with different names, namely, Shih yüan island,[251] Shih mountain, Yang island, and Yen tun island; we seek to identify them with Pulau Chipu, Pulau Rhu, Pulau Lang Tengah, and Pulau Susu Dara, respectively; see Addendum B.

On the southward voyage, long-distance shipping ran down from K'un-lun mountain [Grande Condore] to Kelantan in 30 watches as in texts (8) and (32), or to Pulau Kapas in 28 watches as in text (29), or to Pulau Tenggol in 30 watches as in texts (14) and (32), or to Kuala Pahang in 40 watches as in text (9), or to Pulau Tioman in 45 watches as in texts (11), (19), (23), and (27).

Coastal shipping, according to text (16), travelled from Chi-lan-tan [Kelantan]

steering 172½° for 4 watches to San chüeh island [Pulau Perhentian Besar], and made Chüeh yüan mountain [Pulau Bidong Laut]; then steered 180° for 3 watches to Mien hua island [Pulau Kapas], 180° for 5 watches to Tou island [Pulau Tenggol], 180° for 5 watches to P'êng-hêng [Kuala Pahang], and 180° for 5 watches to Ch'u-p'an mountain [Pulau Tioman], which was passed on the west; thence, passing west of Chiang chün mao [Pulau Tinggi], 172½° for 7 watches to the Lo han islands [Lima islands], where ships travelled north of Pai chiao [Pedra Branca] into Singapore strait.

Ships bound for Chiao-liu-pa ['Kelapa', Batavia, now Djakarta], instead of turning into Singapore strait, travelled on to the south, passing Mien-tan mountain [Bintan Great Hill] after 4 watches' voyaging from Pulau Tinggi, as in text (17)

The manual called 'Shun Fêng' has a special section headed "Kêng [Pahang]. A sketch of the aspects of the mountains and the conditions of the waters". Here it is stated that the run from Pulau Tenggol to Kuala Pahang took 5 watches, that Pulau Tenggol and an island called T'ieh chên ['Iron anvil'] were 'mutually visible', and that 'opposite' to T'ieh chên island was a mountain called Ta tsao ch'uan ['Build ship'] mountain. These places are difficult to identify; we provisionally identify T'ieh chên island with Pulau Ular (4°03'N.) and Ta tsao ch'uan mountain with Bukit Panjang (4°06'N.): but these identifications are doubtful; see Addendum C.

A 'reasonable' course for coast-wise shipping turning north at a point 1½ miles north of Pedra Branca would be:—

From 1°19′ 48″ N., 104°24′20″E. to a point 5 miles east of Pulau Tinggi; 349°; 59 miles

Thence to a point 5 miles west of Pulau Tioman; 335½°; 26 miles

Thence to a point 5 miles east of Kuala Pahang; 330°; 59 miles

Thence to a point 5 miles east of Pulau Tenggol; 11½°; 74 miles

Thence to a point 5 miles east of Pulau Kapas; 313½°; 38 miles

Thence to a point 2 miles west of Pulau Bidong Laut; 315°; 27 miles

Thence to a point 1 mile west of Pulau Perhentian Besar; 312°; 25 miles

Thence to a point 9 miles north-east of Kuala Kelantan; 317°; 38 miles

Over short distances the Chinese bearings are fairly satisfactory, but over long distances, for instance, from Pulau Kapas to Grande Condore, they are sometimes very wide of the mark, according to modern conditions.

Identifications

Of the Arab names, Tinggi reproduces the Malay name; Kalandan (haven or anchorage) is sufficiently close to obviate any doubt; and, though the 'Patik' of Pang Patik cannot at present be explained, 'Pang' must surely, like the Portuguese 'Pam', represent Pahang.[252]

Of the Chinese names, a disconcertingly large number are purely Chinese, but fortunately the geographer has veritable land-marks in P'êng-hang [Pahang], Ting-

chia-lu [Terengganu], and Chi-lan-tan [Kelantan]; while the 'Chu' ['bamboo'] of Tung Hsi Chu suggests a clue to the identification with Pulau Aur ['Aur', Malay, a species of bamboo], and 'Mien hua' ['cotton'] to the identification with Pulau Kapas ['kapas', Malay, 'cotton'].[253]

Mien-tan is mentioned in text (17) as being reached after a southward journey of 4 watches from Pulau Tinggi; this indicates the identification of Mien-tan with Bintan Great Hill, and the identification is rendered reasonably certain by the similarity of name.

Thus Mien-tan was the same land-mark as the Ma an mountain ['Horse saddle mountain'] of text (27), associated with the Lo han islands [Lima islands] and Pai chiao [Pedra Branca] as leading marks for the navigator entering Singapore strait from the east. In text (11) Bintan Little Hill and Bintan Great Hill are called the North and South Saddles. In text (18) Bintan Great Hill is given the honorific of Shih-li, 'Sri'.

Chiang chün mao ['General's Hat'] may safely be equated with Pulau Tinggi by reason of the bearings, re-inforced by the striking shape of the almost-perfect cone of the peak.

The three islands called Hai mountain ['Sea mountain'], Huo shao mountain ['Fire burn mountain', also called 'Fire burn tower', so perhaps a lighthouse] and Chu mu ['Pig mother'] lay on the south side of Pulau Tinggi and were named the 'Hat Band'; doubtless they comprised some of the islands called Sibu and Lima; but there is insufficient evidence to show which was which.[254]

Tung Hsi Chu ['East and West Bamboo'] are sometimes referred to as Tung Chu mountain or Hsi Chu mountain; the saddle-shaped Pulau Aur with peaks of 1765 and 1460 feet often presents an appearance of being two islands.[255]

Pulau Tioman is called Ch'u-ma or Ch'u-p'an or Ti-p'an or Ch'a-p'an: although not named in the Arab texts here considered, the island is referred to in the *Akhbar as-Sin wa'l-Hind* (A.D. 851) and in the works of Ibn Khurdadhbih (844–8) and Idrisi (1154).

Shih tao ['Lose knife'] mountain on Pulau Tioman may perhaps be the remarkable twin-peaked hill of 1495 feet near the south-eastern extremity of the island; the chart gives it no special name.

P'êng-hang harbour or anchorage is, of course, the estuary of the Sungei Pahang.

T'ieh chên ['Iron anvil'] island and Ta tsao ch'uan ['Build ship'] mountain are perhaps Pulau Ular and Bukit Panjang, respectively, as suggested in Addendum C.

Tou ['Bushel'] island and Mien hua ['Cotton'] island must be Pulau Tenggol and Pulau Kapas, respectively, as shown by many references to bearing and time. The Chinese translated the Malay name, *kapas*, 'cotton'. North of Sungei Terengganu, the identification of various islands in the Redang and Perhentian groups is discussed in Addendum B.

Views of Pulau Aur, Pulau Tioman, and Pulau Tenggol may be seen in 'Pilot', No. 30, views 6, 8, and 9.

Pedra Branca to Kuala Kelantan

TABLE IX

	Chinese course	'Reasonable' course	Time (watches & hours)	Approximate distance (miles)	Speed (knots)
Pedra Branca (near) to Pulau Tioman	330°, then 352½°	349°, then 335½°	10 / 24	85	3.5
Pulau Tioman to Kuala Pahang	[*330°, estimated*]	330°	[*5 / 12*] [*estimated*]	59	4.9
Kuala Pahang to Pulau Tenggol	360°	11½°	6 / 14.4	74	5.1
Pulau Tenggol to Pulau Kapas	330°	313°	5 / 12	38	3.1
Pulau Kapas to Pulau Bidong Laut	[*315°, estimated*]	315°	[*3 / 7.2*] [*estimated*]	27	3.7
Pulau Bidong Laut to Pulau Perhentian Besar	300°, then 315°	312°	3 / 7.2	25	3.4
Pulau Perhentian Besar to Kuala Kelantan (abeam)	337½°	317°	3 / 7.2	38	5.2
			35 / 84	346	
				Average	4.1

North-west Borneo

TABLE X

Arab name	Chinese name	Latitude	Modern name
	Tung Shê lung mountain*(59)*	2°05′N.	Tanjong Datu
	Tan-jung Lao-mei*(60)*	2°47′N.	Tanjong Sirik
	Ch'ih t'u pai mien mountain*(61)*	2°58′N.	Bukit Setiam
	Tan shui harbour*(62)*	4°36′N.	Batang Baram
Barani[31]			Borneo (island)

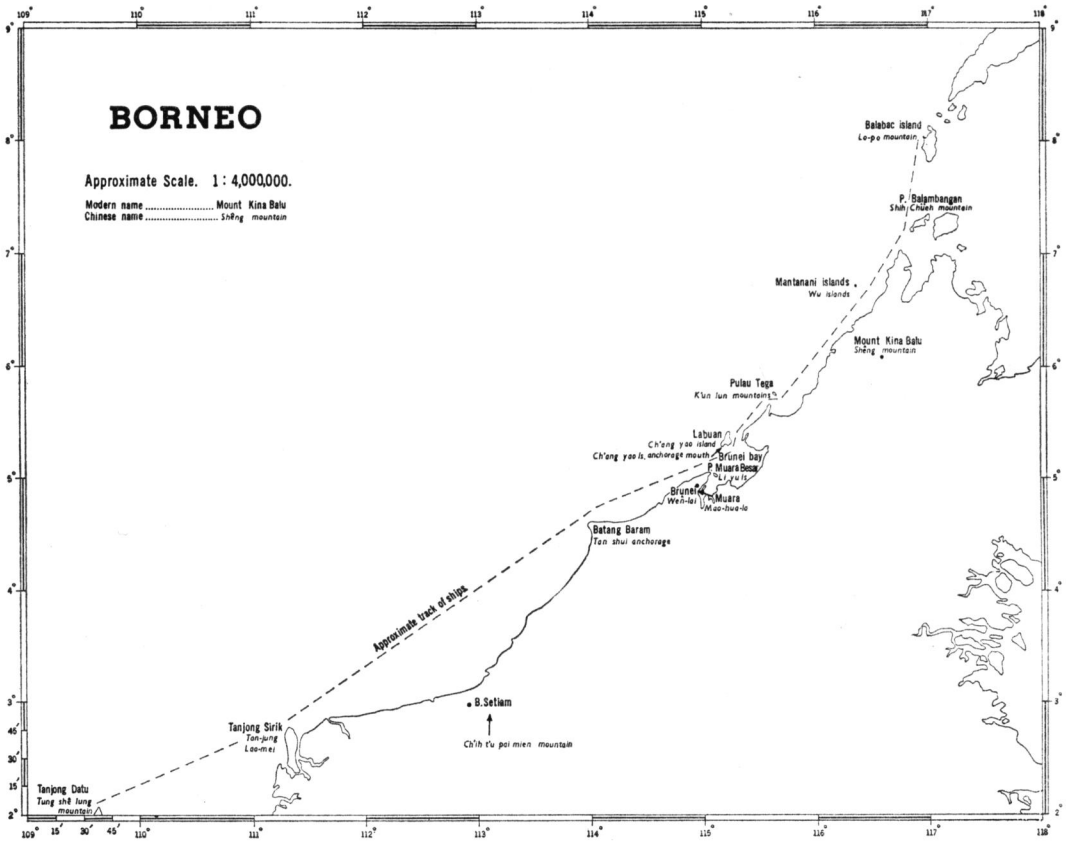


Fig. 3. Map of Borneo

P'o-ni(63) / Wên-lai(64)		Borneo (country)
Mao-hua-la(65)	4°53′N.	Borneo (town)
Li yü island(66)	c.5°00′N.	Pulau Muara Besar
Ch'ang yao island(67)	c.5°16′N.	Labuan island
Ch'ang yao island harbour(68)	c.5°16′N.	Victoria harbour?
K'un-lun mountains(69)	c.5°42′N.	Pulau Tega
Shêng mountain(70)	6°04′N.	Mt. Kina Balu
Wu islands(71)	6°43′N.	Mantanani islands
Shih chüeh mountain(72)	c.7°15′N.	Pulau Balambangan
Lo-po mountain(73)	c.8°00′N.	Balabac island

See British Admiralty charts 2660A, 2660B, and 2107, and 'Pilot', No. 31 and Supplement No. 7 — 1971.

Sailing directions

Arab

Directions are wanting

Chinese

(1) The Mao K'un map names, on the route from Vietnam to Java, Tung Tung [Pulau Sapatu], Hsi Tung [Great Catwick], and, close to the coast of Borneo, Tung Shê lung [Tanjong Datu], and Sha wu p'i [Merundung island].[256]

(2) [*Voyage from Thailand via Borneo to the Philippines*].

"--- Ta hêng mountain [Poulo Panjang]; [steer] 127½°; 80 watches; make Ch'ih t'u pai mien mountain [Bukit Setiam]; take a sounding, 32 fathoms; [steer] 37½°; 15 watches; make Tan shui haven [Batang Baram]; [steer] 37½°; 10 watches; make Ch'ang yao island [Labuan]; this is So-lo harbour; on the horse-door side [starboard] there is a [piece of the] land and on the north-east side there is a small island; [steer] 37½°; 5 watches; make K'un-lun mountains [Pulau Tega]; in the distance you see 3 pointed mountains; pass on the inside; [steer] 37½°; 10 watches; make Shêng mountain [Mount Kina Balu] and [then] Wu [Mantanani] islands on the sail-spread side [port]; [steer] 52½°; 5 watches; make Shih chüeh mountain [Pulau Balambangan]; [steer] 7½°; 5 watches; make Lo-po mountain [Balabac island]".[257]

(3) [*Voyage from the Philippines viâ Borneo to Thailand*]

"--- Lo-po mountain [Balabac island]; [steer] exactly 180°, and [then] 187½°; 10 watches; make Wu [Mantanani] islands; [then] make Shêng mountain [Mt Kina Balu]; [steer] 262½°; 10 watches; make Chên K'un-lun mountains [Pulau Tega]; pass

inside them; [steer] exactly 210°; 5 watches; make Ch'ang yao island [Labuan]; [steer] exactly 210°; 10 watches; make Tan shui harbour [Batang Baram].
If there is an east wind, steer 282½°; if there is a north wind, steer exactly 225°; 40 watches; make Tung Shê lung [Tanjong Datu]. If you are over against Ch'ih t'u pai mien [Bukit Setiam], put out to sea; steer 292½° and [then] exactly 330°; 50 watches; [steer] exactly 315°; 45 watches; make the side of Pi chia [Sam Roiyat]".[258]

(4) [*Voyage from Ch'u-p'an* [*Pulau Tioman*] *to Wên-lai*, [*Brunei*].
"--- Tung His Shê lung mountain [Tanjong Datu]; foreigners call it by the name of Tan-jung Tu mountain; there are also some small islands; steer exactly 60°; 20 watches; make Tan-jung Lao-mei mountain [Tanjong Sirik]; foreigners call it by the name of Tan-jung Ssū-li mountain --- take a sounding, 3 fathoms; steer exactly 60°; 11 watches; make Ch'ih t'u pai mien mountain [Bukit Setiam].

In the distance you see that on the mountain there is a stone cliff resembling the shape of a sail. Follow the mountains and proceed; 10 watches; make Tan shui harbour [Batang Baram]; --- take a sounding, 3–4 fathoms; ---; steer 67½° and [then] exactly 60°; 10 watches; make Wên-lai harbour [Sungei Brunei] --- on the east side there is a large mountain; on the north is Ch'ang yao island harbour [Victoria harbour?]; make Mao-hua-la [Muara]; stop the ship."[259]

(5) [*Voyage from Wên-lai* [*Brunei*] *to Ch'u-p'an* [*Pulau Tioman*]
"Set sail from Wên-lai harbour [Sungei Brunei], ---; [steer] exactly 285° and [then] 255°; 10 watches; make Tan shui harbour --- take a sounding, 3 fathoms; ---; follow the mountains and proceed; 10 watches; make Ch'ih t'u pai mien [Bukit Setiam]:
in the distance you see that on the mountain there is a stone cliff resembling the shape of a ship's sail; [steer] exactly 255°; 10 watches; make Tan-jung Lao-mei mountain [Tanjong Sirik]; --- take a sounding, 3 fathoms; [steer] exactly 240°; 20 watches; make Hsi Shê lung mountain [Tanjong Datu]".[260]

(6) [*Voyage from Lü-sung* [*Luzon*] *to Wên-lai* [*Brunei*]
"--- Shih chüeh mountain [Pulau Balambangan]; [steer] exactly 210°, [and then] exactly 195°; sight Shêng mountain [Mount Kina Balu]; [steer] exactly 210° and [then] 217½°; make K'un-lun mountains [Pulau Tega]; on the outside there is *lao-ku* rock; when you have passed the strait, go 217½° and [then] 232½°; as you proceed, you see Ch'ang yao island [Labuan]; [steer] 202½°; seek Li t'ang island [Pulau Muara Besar]; [steer] 202½°; close at hand is Wên-lai (P'o-ni) haven [Sungei Brunei]".[261]

(7) [*Voyage from Wên-lai* [*Brunei*] *to Lü-sung* [*Luzon*]
"Set sail from the harbour; go out past Li t'ang island [Pulau Muara Besar]; [steer] exactly 15°; 5 watches; make Ch'ang yao island [Labuan]; pass through the middle of the strait; steer 37½°; 3 watches; make K'un-lun [Pulau Tega]; in the distance you observe that [the group] is made up of three islands; they are K'un-lun; [steer] 22½°; 5 watches; make Wang yen mountain [Mount Kina Balu]; [it is] high and large and has clouds [upon it]; when going and returning, release an ornamented boat and offer sacrifices; [steer] 37½°; 3 watches; make Wu lun [Mantanani islands]; [steer] 37½°; 8 watches; make Po mountain [Balabac]".[261]

(8) [*Voyage from Ch'üan Chou to Wên-lai* [*Brunei*]
"You see Ku po mountain [Balabac]; again, you see Shêng mountain [Mount Kina Balu] opening out opposite [to you]; it is high and large [and] has clouds [upon it];

Shih chüeh mountain is pointed; [steer] 217½°; make K'un-lun mountains [Pulau Tega]; outside them there are *lao-ku* shoals, level [with the surface]; navigate the ship [through] the strait; [steer] 217½° and [then] exactly 210°; follow the land and proceed; make Ch'ang yao island [Labuan]; there is a strait; [steer] 187½°; make Li yü island [Pulau Muara Besar]; reach Mao-hua-la [*Muara*]; this is P'o-ni [Brunei], that is, Wên-lai [Brunei]."[262]

(9) [*Navigational notes on places in Borneo*]

"Shih chüeh mountain [Pulau Balambangan]. [Steer] 202½°; 8 watches; and [steer] exactly 195°; make Shêng mountain [Mount Kina Balu]. Shêng mountain [Mount Kina Balu]. It fills the heavens — high and large.

Below Shêng mountain [Mount Kina Balu]. The two opposite islands are Wu islands [Mantanani islands].

Wu islands [Mantanani islands]. [Steer] 202½°; 5 watches; you are level with three islands called K'un-lun [Pulau Tega].

K'un-lun mountains [Pulau Tega]. Close by, you see three [islands]; at a distance, you see one [island]; as you put to sea, there are *lao-ku* rocks; [steer] 232½°; 1½ watches; [make] Ch'ang yao island strait [Labuan east channel]; follow the land and proceed.

Ch'ang yao island. [*No note*]

Li yü t'ang. [*No note*]

P'oli [Brunei]. It is also called Mao-hua-la [*Muara*]; that is, Wên-lai [Brunei]."[263]

(10) [*Voyage from Lü-p'êng* [*Lubang*] *to the country of Wên-lai* [*Brunei*].

"Lo-po mountain; steer 202½°; 3 watches; make Shêng mountain [Mount Kina Balu].

Shêng mountain [Mount Kina Balu]. --- steer exactly 210° and [then] 217½°; 5 watches; make K'un-lun mountains [Pulau Tega].

K'un-lun mountains [Pulau Tega]. --- steer 217½°; make Ch'ang yao island [Labuan].

Ch'ang yao island [Labuan]. The ship passes through the island strait; steer exactly 180°; 5 watches; make Li yü t'ang [Pulau Muara Besar]. Li yü t'ang. Make Mao-hua-la [*Muara*]; that is, Wên-lai [Brunei] harbour.

The country of Wên-lai [Brunei]. That is, the country of P'o-lo; this is the very end of the Eastern Ocean, and is the place where the Western Ocean begins; therefore P'o-lo is the terminus."[264]

Bearings

From Tung Shê lung mountain [Tanjong Datu] Chinese ships steered 60° for 20 watches to Tan-jung Lao-mei [Tanjong Sirik] [the bearing on the modern chart being 67½°]; thence on the same course [actually 55½°] for 11 watches until Ch'ih t'u pai mien [Bukit Setiam] was brought abeam; thence 37½° [actually 55½°] for 15 watches to a point where Tan shui harbour [Batang Baram] was brought abeam; thence they steered 67½° [actually 66½°, which would bring them off Brunei cliffs], and then changed course to 60° [presumably to give a wide berth to Pelong rock]; this stage took 10 watches; after which, though no directions are given, they found their way through Brunei bay to Wên-lai harbour [Sungei Brunei].

Sometimes they by-passed Brunei, and from Batang Baram steered 37½° [actually 66½°, 75°, and 29°] for 10 watches until they entered the channel on the east side of Ch'ang yao island [Labuan].

Starting from Wên-lai [Brunei], ships made Li yü or Li t'ang island [Pulau Muar Besar], then steered 15° [actually 29°] for 5 watches to the channel on the east side of Ch'ang yao island [Labuan]; they then steered 37½° [actually 355½°, 32½°, and 90°] for 5 watches to the channel on the east side of K'un-lun islands [Pulau Tega], then 22½° [actually 24°, and 40½°] for 5 watches till Shêng or Wang yen mountain [Mount Kina Balu] was brought abeam, then 37½° [actually 40½°] for 3 watches to the channel on the east side of Wu islands [Mantanani islands], and finally 37½° [actually 30°] for 5 watches to Shih chüeh mountain [Pulau Balambangan].

In the opposite direction, the navigator was instructed to steer as follows:—

from Shih chüeh mountain [Pulau Balambangan] to Shêng mountain [Mount Kina Balu]	202½°, then 195°	8(?)	watches
thence to K'un-lun mountains [Pulau Tega]	210°, then 217½°	5	"
thence to Ch'ang yao island [Labuan]	210°	5	"
thence to Tan shui harbour [Batang Baram]	210°	10	"
thence to Ch'ih t'u pai mien [Bukit Setiam]	[*not stated*]	10	"
thence to Tan-jung Lao-mei [Tanjong Sirik]	255°	10	"
thence to Hsi Shê lung [Tanjong Datu]	240°	20	"

A 'reasonable' course for the northward voyage would be:—

From Tanjong Datu to Tanjong Sirik	67½°
thence to a point where Bukit Setiam was brought abeam	55½°
thence to Batang Baram	55½°
thence to Labuan (east channel)	66½°, 75°, 29°
thence to Pulau Tega (east channel)	355½°, 32½°, 90°
thence to a point where Mt. Kina Balu was brought abeam	24°, 40½°
thence to Mantanani islands (east channel)	40½°
thence to Pulau Balambangan	30°

The courses specified in the Chinese texts, when laid down in British Admiralty chart 2660B, appear to exhibit very unequal degrees of accuracy; sometimes a bearing almost exactly tallies, as on the voyage from Batang Baram to the neighbourhood of Brunei cliffs; sometimes a bearing differs slightly, as on the voyage from the neighbourhood of Mount Kina Balu to the Mantanani islands; sometimes a bearing is wide of the mark, as on the voyage from the neighbourhood of Brunei cliffs towards Brunei Bay; (here the navigator would later have to turn eastward, but this is not recorded in the texts); finally sometimes a bearing appears to be suicidal, as on the voyage northward from the Mantanani islands, when the bearing of 52½°, as in text (2), would inevitably lead to shipwreck near Agal bay.

Sometimes the Chinese figures for bearings are deficient in detail; for instance, the bearing of 37½° must be altered in order to make the east side of K'un-lun islands [Pulau Tega] from Labuan east channel.

Identifications

Arab name

The Arab texts give only one name, Barani, also called Barni and Burnai. It is stated that at the most northerly point the altitude of the Pole Star was 5 fingers, and that at the most southerly point the altitude of Ursa Minor was 6 fingers; this range of about 600 miles shows that the name Barani referred to the whole island of Borneo, or perhaps to a group of islands bearing this name. The actual difference between the latitude of the north point and the south point is about 772 miles.

Chinese names

The enquirer is confronted with a formidable array of names, mostly of Chinese origin and at first sight inexplicable; however, they yield to treatment; the figures given for bearings and times in the texts, coupled with incidental pieces of information, make it possible to identify all the places, with one exception, beyond reasonable doubt. The enquiry breaks new ground for the historical geographer, and the best plan of attack, it seems, will be to investigate the groups of names in three areas; (a) first, the central area, around Brunei, (b) secondly, the coast-line to the south of Brunei, (c) thirdly the coast-line north of Brunei.

(a) The first area includes 6 names, namely, P'o-ni, Wên-lai, Mao-hua-la, Li yü island, Ch'ang yao island, and Ch'ang yao island harbour.

Fortunately, the enquirer is provided with a veritable 'centrum', for undoubtedly P'o-ni and Wên-lai mean Brunei.

Both the country and the town were known to the Chinese as P'o-ni and Wên-lai, and P'o-li of text (9) is a variant of P'o-ni.

According to text (10) the country was also called P'o-lo; but Fairbank and Têng said that this statement, which appears also in the *Ming Shih*, is erroneous, and Pelliot considered that in Ming times P'o-lo meant another country, exact situation unknown, on the north coast of Borneo; moreover, Li Hsien differentiated between the countries of P'o-ni and P'o-lo.[265]

According to texts (8) and (9) P'o-ni and Wên-lai were also known to the Chinese as Mao-hua-la, 'Muara', but this may refer to the town only.

Ch'ang yao island, 'Long waist island', was reached by sailing on a bearing of 15° from Sungei Brunei, as in text (7), and south-bound ships from Ch'ang yao island sailed on a bearing of 202½° or 187½° or 180° to Sungei Brunei, as in texts (6), (8), and (10); further, Ch'ang yao island was separated from the mainland by a strait, and coast-wise shipping from the north sailed through this strait on a bearing of 210°, as in text (3); moreover, the voyage from Ch'ang yao island to Li yü t'ang (Li t'ang island) took 5 watches, as in text (10), and at Li t'ang island the mouth of Sungei Brunei was "close at hand" as in text (6), so the distance from Ch'ang yao island to Sungei Brunei would probably not exceed 40 miles: a reference to the chart shows that the only island which complies reasonably well with the specified requirements is Labuan island, the direct distance from the mouth of Sungei Brunei being 23 miles.

Ch'ang yao island harbour or anchorage mouth presumably was the So-lo harbour of text (2) and presumably was Victoria harbour, but there is not sufficient evidence to prove the exact location, and the identification with Victoria harbour must be considered doubtful.

Li yü island, 'Carp fish island', also called Li yü t'ang, 'Carp fish ponds', and Li t'ang island, 'Carp ponds island', lay on the route between Sungei Brunei and Labuan, and navigators were told to look out for it; ships bound for Sungei Brunei, after passing Labuan sailed on a bearing of 180° and reached Li yü island after 5 watches, as in text (10); ships bound northward from Sungei Brunei sailed on a bearing of 15° from Li t'ang island and reached Lâbuan after 5 watches, as in text (7); from the fact that in text (6) the navigator was given a bearing to follow when sailing from Li yü island to Sungei Burnei it may reasonably be deduced that the mouth of Sungei Brunei was not readily visible from Li yü island and therefore lay some little distance away; on the evidence Li yü island must be Pulau Muara Besar, the eastern end of which lay 7 miles from the entrance of Sungei Brunei and 17 miles from the nearest point on Labuan island.

(b) The second area includes 4 names, namely, Tung Shê lung mountain, Tan-jung Lao-mei, Ch'ih t'u pai mien, and Tan shui harbour.

Tung Shê lung mountain, 'East Snake dragon mountain', the most southerly place, was also called Tung Hsi Shê lung mountain, 'East and West Snake dragon mountain', or Hsi Shê lung mountain, or Lung shê mountain. We identify it with Tanjong Datu, because:—

(a) Tung Hsi Shê lung mountain was stated in text (4) to be a land-mark on the west-east voyage from Ch'u-p'an [Pulau Tioman] to Wên-lai [Brunei], the journey taking 40 watches from Pulau Tioman and 51 watches from Brunei,

(b) the nautical manual 'Shun Fêng' mentioned Lung shê mountain as a land-mark on the north-south voyage from Tung Hsi Tung [Linschoten's 'Tomsitom', Îles Catwick] to Chia-li-ma [Karimata],[266]

(c) this notable land-mark on both the west-east route and the north-south route could only be near the 'horn' of Borneo, in the neighbourhood of Tanjong Api-Tanjong Datu,

(d) confirmatory evidence is supplied by the fact that in describing this locality the manual 'Shun Fêng' stated that "in the middle of the strait there is one small island called Sha hu p'i,[266] while the Mao K'un map marked an island called Sha wu p'i near Tung Shê lung off the coast of Borneo; the strait must be Api Passage and the island must be Merundung,[267]

(e) according to text (4), Tung Hsi Shê lung mountain was called by the foreigners Tan-jung Tu, wherein the last word must surely be a contraction of the Malay Datu (Datuk).

Tan-jung Lao-mei mountain, 20 watches' travelling from Tanjong Datu, can be identified because 'Shun Fêng' explains that foreigners called it Tan-jung Ssŭ-li mountain, and Ssŭ-li no doubt represents 'Sirik'.[268]

The texts (4) and (5) give figures for the bearing and time taken on the voyages between Tanjong Datu and Tanjong Sirik, and these figures are of the greatest value because they provide a measuring-stick, albeit somewhat elastic, for locating the other places on the Borneo coast; the distance of 108 miles took 20 watches (48 hours) in both directions, giving a speed of 5.4 miles in 1 watch, or 2.2 knots

Tan shui harbour or anchorage was reached in 10 watches from Labuan, as in text (3), and the journey in the opposite direction took the same time, as in text (2); also, the journey from Tan shui harbour to Tanjong Datu took 40 watches, as in text (3), hence Tan shui harbour must have been situated about one-fifth of the distance, about 393 miles, from Labuan to Tanjong Datu, that is, it was situated about 78 miles from Labuan; moreover, south-going ships from Labuan changed course from 210° to 225° or to 282½°, as in text (3), at Tan shui harbour; hence it is reasonably certain that Tan shui harbour was Batang Baram, 92 miles from Labuan, since Tanjong Baram is the only salient point on this part of the coast, where a change of bearing would be needed.

Ch'ih t'u pai mien, 'Red earth white face', presents a little difficulty; in those days there must have been something most distinctive about this part of the coast, since ships travelling all the way from Ta Hêng, Poulo Panjang, in the Gulf of Thailand sought this land-mark after a direct journey of about 650 miles; the Chinese saw it as a red hillside with a white stone cliff resembling a sail in shape.

Ch'ih t'u pai mien was reached from Tanjong Sirik in 11 watches, according to text (4), and the further voyage to Batang Baram took 15 watches; (text (4) says 10 watches, but this is too short a time); the distance in a direct line from Tanjong Sirik to Batang Baram is 193 miles, hence we may expect to find Ch'ih t'u pai mien at a point about 82 miles from Tanjong Sirik and 111 miles from Batang Baram.

We therefore identify Ch'ih t'u pai mien with Bukit Setiam, 2°58′N., 112°55′E., a conspicuous hill, 2095 feet high, brought abeam after a voyage of 85 miles from Tanjong Sirik.

A view of the hill may be seen in the 'Pilot'.[269]

(c) The third area includes the names of 4 places in and adjacent to Borneo, namely, K'un-lun mountains, Shêng mountain, Wu islands, and Shih chüeh mountain.

K'un-lun mountains or islands were also called Chên K'un-lun, 'True K'un-lun'; they were reached after 5 watches' travelling from Labuan, according to text (2);

hereabouts this would represent a distance of approximately 37 miles; a reference to the chart shows that K'un-lun must be the islands called Pulau Tega, lying some 31 miles from Labuan as the crow flies; the bearing of 37½° is an over-simplification, since from the middle of Labuan east channel the ship must steer 355½° to clear Tanjong Sakat, then 32½° to clear Tanjong Nosong, and then 90° in order, as advised, to reach the east side of Pulau Tega, but the Chinese texts do not give all the details; the distance on a 'reasonable' course is 40 miles.

Shêng mountain, 'Holy mountain', or Wang yen mountain, 'Gaze-at mist mountain', was brought abeam after a voyage of 5 watches on a bearing of 22½° from Pulau Tega, as in text (7); it constituted an outstanding land-mark; high and large, it filled the heaven and had clouds on it; here devout mariners released an ornamental boat and offered sacrifices; it cannot be doubted that this was Mount Kina Balu (13,450 feet), brought abeam after a journey of 50 miles from Pulau Tega.

Wu islands, 'Five islands', also called Wu lun, were reached after the ship had proceeded for a further 3 watches on a bearing of 37½°, as in text (7); in this period of time the ship would normally travel about 16.2 miles; a reference to the chart shows that the Wu islands must be the Mantanani islands; they were passed on the east side. Finally, north-bound shipping made Shih chüeh mountain, 'Dung corner mountain', as in texts (2) and (7), sailing from the east side of the Mantanani islands on a course of 37½° for 5 watches, which would normally represent a distance of about 27 miles; at Shih chüeh mountain some ships turned eastward to enter the Sulu sea and proceed to Mindanao;[270] hence we identify this mountain with Pulau Balambangan; a 'reasonable' course from the east side of the Mantanani islands would be 30° and the nearest distance between the respective islands is 40 miles; from Pulau Balambangan some ships sailed northward to Lo-po mountain, Balabac island,[271] and thence by way of Palawan to Luzon.[272]

Views may be seen in 'Pilot', No. 31, pages 378–380, and 385–386.

Tanjung Datu to Pulau Balambangan

TABLE XI

	Chinese course	'Reasonable' course	Time (watches & hours)	Approximate distance (miles)	Speed (knots)
Tanjong Datu to Tanjong Sirik	60°	67½°	20/48	108	2.2
Tanjong Sirik to Bukit Setiam (abeam)	60°	55½°	11/26.4	85	3.2
Bukit Setiam to Batang Baram	37½°	55½°	15/36	108	3.0
Batang Baram to Labuan	37½°	66½° then 75°, then 29°	10/24	92	3.8
Labuan to Pulau Tega	37½°	355½° then 32½° then 90°	5/12	40	3.3
Pulau Tega to Mt Kina Balu (abeam)	22½°	24° then 40½°	5/12	50	4.1
Mt Kina Balu to Mantanani islands	37½°	40½°	3/7.2	22	3.0
Mantanani islands to Pulau Balambangan	37½°	30°	5/12	46	3.8
			74/177.6	551	
				Average	3.1

ADDENDUM A. (See page [23] Supra)

'The four islands, Pulau Mal'aqa, Pulau Sabta and their fellows'.

As the Arab navigator approached Melaka from the north he saw four islands; one was on his left and nearest the shore; this was called 'Pulau Ubi', and doubtless is the modern Pulau Upeh, one mile from the shore.[273]

Opinions may differ as to the identification of the other three islands. There are two alternatives.

First, they may be the two islets called Pulau Jawa lying about 1600 yards southward of St Paul's Hill, and the islet called Pulau Panjang lying about 2 miles south-south-eastward of St Paul's Hill.[274]

Secondly, they may be three of the Water islands, a group of seven islands or islets, the largest of which is Pulau Besar, lying about 6½ miles south-east of Melaka and 2 miles off-shore.[275]

We provisionally prefer the former alternative for four reasons:—

(a) a map of Eredia (1613) shows that Pulau Malacca is to be identified with the modern Pulau Jawa,[276]

(b) the natural interpretation of the expression 'the four islands, Pulau Mal'aqa, Pulau Sabta and their fellows' suggests that these four islands were in the same group,

(c) the location of Pulau Sabta in the same group as Pulau Jawa supports the view of de Jong that 'Pulau Sabat' lay nearer to Melaka than Pulau Besar in the Water islands,[277]

(d) the navigator of a ship approaching Melaka from the north would be much more interested in islands lying two miles away from the port than in the Water islands lying 6½ miles away to the south-east.

ADDENDUM B (See page [39] Supra)

The Redang and Perhentian Islands.

The Mao K'un map contains a sketch of these islands, reproduced in the article of Mills and in the book of Wheatley.[278]

This sketch shows two islands nearer to the mainland, namely, Shih yüan island, about 20 miles further north than the mouth of the Sungei Terengganu, and Shih mountain, off the mouth of the Sungei Kelantan.

Further out to sea it shows a row of 4 islands, almost equally spaced, parallel with the coast; the first was called Chüeh yüan and lay about half way between Shih yüan island and Shih mountain; the second was called Yang island and lay opposite to Shih mountain; the third was called San chüeh island; and the fourth was called Yen tun island; the last-named was represented to lie further north than the Hsi river, but this is a serious error, since the mouth of the Hsi [Saiburi] river lies in a latitude 44 miles further north than that of the Perhentian islands.

The sketch marks a sea-route running from the north along the west side of Yen tun island and San chüeh island; and the main route of shipping is shown to run along the east side of all the islands; texts (16) and (24), however, specify a route running through the strait between the mainland on the west and certain islands on the east.

A reference to chart 2414 shows that the route contemplated in these texts ran on the east side of Pulau Rhu and Pulau Chipu, on the west side of Pulau Susu Dara, the Perhentian islands, and Pulau Lang Tengah, and on either the west side or the east side of Pulau Bidong Laut.

To consider the four islands on the east side of the route. The most northerly island marked in the Mao K'un map was named Yen tun island, 'Beacon island'; there seems no reason to doubt that it was the first danger encountered by a ship proceeding southward, and we therefore identify it with the most northerly of the islands under consideration, that is, Pulau Susu Dara (710 feet).

Nor does there seem any reason to doubt that the next danger, San chüeh island, 'Three corner island', was the next group of islands on the route, namely, the Per-

hentian islands; Pulau Perhentian Kechil (1125 feet) and Pulau Perhentian Besar (1134 feet) are separated by a narrow channel and the Chinese probably regarded them as a single island.

The most southerly of the four islands, Chüeh yüan, 'Corner round', was also called Yüan kuang, 'Round bright'; it was the island which could be passed either on the west or the east; and this must be Pulau Bidong Laut (1055 feet), the first danger encountered by a ship travelling northward from Pulau Kapas.

Yang island, 'Goat island', lying between Chüeh yüan and San Chüeh island, might be either Pulau Lang Tengah (520 feet) or Pulau Redang (1249 feet); we prefer the former because it lies nearer to the route. To consider the two islands on the west side of the route. The Mao K'un map marks only two such islands, the more southerly called Shih yüan island, 'Scholar round island' (or T'u yüan island, 'Earth round island'), and the more northerly called Shih shan, 'Stone mountain'. Chart 2414 marks only two islands on the west side of the route, the more southerly called Pulau Chipu, and the more northerly called Pulau Rhu. It necessarily follows that Shih yüan island and Shih mountain should be identified with Pulau Chipu and Pulau Rhu, respectively; and if so, the Mao K'un map places Shih yüan island too far to the south.

In view of further evidence which has since come to light, especially the two MS manuals in the Bodleian Library, the present writer has had to modify some of the views expressed in 1937; for instance, in the Mao K'un map, K'un hsia ch'i appears to be an island, but further examination shows that the expression means 'lower river of K'un [Nakhon]' and refers to Pattani.

Professor Wheatley queried the identification of all these islands except T'u yüan (Shih yüan) island, which he identified with Pulau Bidong Laut.

ADDENDUM C (See page [40] supra)

Pulau Tenggol to Kuala Pahang.

This was a fast run of 74 miles in 5 watches (12 hours), that is, at 6.1 knots.

We presume that the *hsü*, 'island', of T'ieh chên was actually an island, and not a hill on the mainland.

We may reasonably presume that the author of this note wishes to draw attention to the salient points on the voyage from Pulau Tenggol to Kuala Pahang, and we may reasonably expect that these points would refer to the more southerly portion of the voyage where the ship approached the land.

The only island between Pulau Tenggol and Kuala Pahang is Pulau Ular; hence we provisionally identify T'ieh chên island with Pulau Ular, 4°03′N., 31 miles north of Kuala Pahang[279]

'Opposite' to Pulau Ular, that is, on about the same latitude on the mainland, is Bukit Panjang, 4°06′N., (800 feet), hence we provisionally identify Ta tsao ch'uan mountain with Bukit Panjang.

One might regard these identifications as reasonably certain were it not for the statement that Pulau Tenggol and T'ieh chên island were 'mutually visible'. The

distance between Pulau Tenggol and Pulau Ular is 48 miles, and since Pulau Ular is only 50 feet high, it seems doubtful whether it could be seen from Pulau Tenggol. But perhaps the writer was speaking loosely, and meant merely that Pulau Tenggol, 907 feet, was visible from T'ieh chên island.

ADDENDUM D (See page 2 Supra)

Malay place-names.

De Jong has collected the Malayan and Sumatran place-names mentioned in Malay classical literature and has located them in a map.[280]

The Arab and Chinese texts studied in the present article reveal the existence of several other Malay names of places in Malaya and Borneo about A.D.1500, and these are set out below.

But caution is necessary; because (a) in some instances we do not know what the Malay name was [e.g. *P'a nao*], (b) a name, though known to the Malays, [e.g. Madura, or Kapas], may have been derived from other [e.g. Indian, or Arab] sources, (c) a Malay name [e.g. Cherakah] may have been applied to a place [e.g. Cherakah islands] to which the Malays applied another name [e.g. Kelang islands], (d) a foreign name [e.g. Niu shih chiao, 'Buffalo Dung rock'] may have been applied to a place independently of any existing Malay name [e.g. (perhaps later) Batu Kerbau, 'Buffalo rock'].

We have listed these 'doubtful' cases separately.

I The Malay Peninsula

Arab or Chinese name	**Modern name**
Butang [islands] (A) Pu-tung [islands] (C)	Pulau Butang
Pinang [island] (A) Pin-lang [island] (C)	Pulau Pinang
Kra [island] (A)	Pulau Kra
Pan Kura [hill] (A)	Pulau Pangkor[281]
Pulau Sembilan [islands] (A) Chiu [islets] (C)	Pulau Sembilan

I The Malay Peninsula *(Cont.)*

Arab or Chinese name	Modern name
Pulau Tanburak (A)	Pulau Jarak
Chi-na [great mountain] (C)	Bukit Cherakah
Pulau Hansa (A)	Pulau Angsa
Pulau Jumar (A)	Djemur
Wên lu ku (C)	Lukut
Pulau Ubi (A)	Pulau Upeh
Pulau Malacca (A)	Pulau Jawa
Pulau Pisang (A) P'i-sung [islands] (C)	Pulau Pisang
Karimun [islands] (A) Chi-li-mên [islands] (C)	Pulau Karimun
Kaling [harbour?] (A)	Kalang
Chu ['bamboo', islands] (C)	Pulau Aur
Doubtful	
Chi-na [five islands] (C) suggests *Pulau Cherakah*	Kelang islands
Qafasi [area] (A) and Mien hua ['cotton', hill] (C) suggest *Bukit Kapas*	Bukit Jugra
Madura [cape] (A)	Cape Rachado
Niu shih ['Buffalo Dung', rock] (C) suggests *Batu Kerbau*	Batu Kerbau
P'i-p'a [island] (C) suggests *Pelepah*	Pulau Sakijang Pelepah

I The Malay Peninsula *(Cont.)*

Arab or Chinese name	Modern name
P'a nao [island] (C) suggests *Prao*[?]	Pulau Anak Sambo
Shih [rock] (C) suggests *Sri*	Pulau Sribuat

II BORNEO

Tung Shê lung alias Tan-jung Tu [cape] (C)	Tanjong Datu
Tan-jung Lao-mei alias Tan-jung Shih-li [cape] (C)	Tanjong Sirik
P'o-ni, Wên-lai } [country] (C)	Brunei
Mao-hua-la [*Muara*, town?] (C)	Brunei
So-lo [*Solok*?, harbour?] (C)	Victoria harbour?

Doubtful

K'un-lun [islands] (C) suggests *Kundur* [?]	Pulau Tega

CONCLUSIONS

(1) The principal Arab authorities are Ahmad bin Majid, Sulaiman bin Ahmad, and Sidi Ali Selebi.

The principal Chinese authorities are the Mao K'un map (published in Mao Yüan-I's *Wu Pei Chih*), the anonymous 'Shun Fêng Hsiang Sung', Lü P'an and Lu Ch'êng-Ên, and Chang Hsieh.

All the documents contain errors.

(2) Arab trading ships, progressing eastward, penetrated to Malayan waters about A.D. 700: Chinese trading ships, progressing westward, found their way to Malayan waters about 795.

(3) Arab traders reached China soon after 724; by about 750 Arab and Persian traders had become the principal middlemen in the trade of China to the south and west, and their ships were the chief means of communication: Chinese trading ships by 805 had reached the north coast of Sumatra.

The great route between China and India ran viâ Palembang and through the Strait of Melaka.

(4) In 879, following disturbances in China, Arab trading ships terminated their voyage at Kalah (perhaps Kedah) on the west coast of the Malay Peninsula, and Chinese ships travelled to Kalah to meet them.

(5) By 900 the Arab seamen were well acquainted with the coast of the Malay Peninsula, but Arab ships after leaving Kalah ran straight through Singapore Strait to 'Tiyumah', Pulau Tioman, and in 1000 the Arabs knew the name of only one place, 'Panhang', in the southern part of the Peninsula: there is no record of the Chinese visiting the southern part of the Peninsula before the latter date.

(6) In 970 the Arab traders resorted again to China; and from this date until 1500 the Arabs remained the leading traders and mariners of the Indian Ocean.

(7) In 977 a trader bearing the Arab name 'P'u Lu-hsieh' opened relations between China and Borneo: at the beginning of the tenth century Chinese were carrying on commercial exchanges in Sarawak, and before the end of that century Kuang Chou (Canton) and Ch'üan Chou were trading directly with western Borneo.

(8) The Arab voyagers were either (according to Hourani) either traders or pirates; and the states of southern Arabia never established a navy: the government of Sung China established a permanent navy in 1132, and from about 1150 until 1433 China was a 'sea power'.

(9) By 1178 Chinese merchants were sailing to India, and they broke the Arab monopoly of the freight and passenger business.

(10) The powerful fleets of the Yüan emperors (1280–1368) ensured the safety of sea-travel between China and western Europe.

In Yüan times Chinese merchants began to take up residence in the 'South Seas'; for instance, in 1350 on Fort Canning Hill, Singapore.

(11) The naval might of the Yung Lê emperor, attaining its zenith in 1421, made Ming China the paramount sea power of the Orient.

Enormous expeditions, mostly under the Grand Eunuch Chêng Ho, showed the flag from Java to Hormuz, and emissaries visited Malindi in Africa and Mecca in Arabia.

Naval bases were established at various ports, including Melaka.

(12) Trade followed the flag, and presumably the volume of China's overseas trade reached a new high point under the Yung Lê emperor (died 1424).

(13) After 1433 the Chinese navy was allowed to disintegrate. On the other hand, after a period of quiescence, there started before 1487 a great efflux of Chinese trading junks from ports in south China to south-east Asia.

In 1500

(14) Arab trading ships were pointed at bow and stern, constructed of planks stitched with palm fibre, (Hourani calls them "frail"), normally single-masted, and about 110 feet long: Chinese trading ships were rectangular in shape, strongly constructed with iron fastenings, usually multi-masted, and about 250 feet long.

(15) Arab ships had a triangular lateen sail, slung fore-and-aft: Chinese ships had a rectangular balance lug, stiffened with battens.

(16) Both Arab and Chinese ship-masters were provided with charts and books of sailing instructions.

(17) Arab sea-captains had a magnetic compass, indicating 32 points, imprecisely spaced: Chinese skippers had a magnetic compass, indicating 24 points, precisely spaced: a combination of two contiguous points provided 48 points.

(18) Arab and Chinese sea-captains, in order to ascertain latitude, measured the altitude of stars above the horizon: the Arabs might use 70 stars or star groups, of which 7 were particularly important, the most important being al-Jah (Polaris, Alpha of Ursa Minor), then al-Murabba' (Alpha of Crux), al-Farqadan (Beta and Gamma of Ursa Minor), and al-Na'sh (Delta, Eta, and Zeta of Ursa Major); the Arabs reckoned that when the altitude of al-Jah was 1 finger, that of al-Farqadan was 8 fingers, and that when the altitude of al-Farqadan was 1 finger, that of al-Na'sh was 13 fingers; they divided the finger (*isba*) of 1°36′25″ into 8 *zam* of 12°03′; measurements were made with an instrument called *khashaba:* the Chinese ordinarily used 10 stars, the most important being Pei ch'ên (Polaris), Têng lung ku (four stars in Crux), and Hua kai (50 of Cassiopeia); the Chinese reckoned that when the altitude of Pei ch'ên was 1 finger, that of Hua kai was 8 fingers; they divided the finger (*chih*) of 1°36′25″ into 4 *chüeh* of 24′10″; measurements were probably made with some kind of cross-staff. Both Arab and Chinese figures varied greatly in accuracy.

(19) The Arab unit of time was a watch of 3 hours, called *zam*, measured by observing the position of the stars in the tail of Ursa Major: the Chinese unit of time was a watch of 2.4 hours, called *kêng*, measured by the burning of an incense-stick.

(20) In Arab theory the unit of distance was a *zam* of 12.05 sea-miles, being one-eight of the distance travelled in order to raise the Pole Star by 1 finger (1°36′25″) when travelling due north; the method of measuring distances is not known; the texts record the following distances in Malayan waters:—

Kuala Kedah to Pulau Pinang, 4 *zam* or 48.2 miles [actually 40 miles],

Pulau Pinang to Pulau Perak, 8 *zam* or 96.4 miles [actually 75 miles],

Kuala Pasai to Dindings, 13 *zam* or 156.6 miles [actually 217 miles]:

in Chinese theory the distance travelled in 1 kêng was reckoned to be 60 *li*, equivalent to a speed of 7.6 knots; Chinese charts and nautical compendia never record distances.

(21) For an Arab ship, a normal speed would be between 2 and 4 knots; on occasions it might have travelled at 5 knots: Chinese ships, in the texts here studied, travelled at a minimum speed of 2.2 knots and a maximum speed of 6.1 knots; the theoretical speed of 7.6 knots could have been attained only in very favourable conditions; a speed of 8 to 10 knots would be quite reasonable for Chêng Ho's ships (Needham).

(22) Arabs and Chinese both considered that the most important factor in navigation was the skipper's knowledge of guides and aids, particularly land-marks; both normally timed their voyages to co-incide with the dates of the south-west and north-east monsoons; both measured the altitudes of the stars in order to ascertain their latitude, but the Arabs observed a greater number of stars and observed them more frequently; both used the plumb-line to measure the depth of the water, but the Arabs used it more frequently: on the other hand, the Arab navigators, unlike the Chinese, showed a predilection for 'sailing along the latitude' to their destination; in changing course the Arabs normally preferred 'wearing' and the Chinese preferred 'tacking', and Chinese ships could sail closer to the wind than Arab ships.

(23) In criticizing the accuracy of the bearings on which fifteenth century navigators were instructed to sail, commentators must needs bear in mind

(a) that there may have been changes in conditions, particularly in respect of variation of the compass, and the direction and force of winds and currents,

(b) navigators were expected to use their discretion and to make a correction when they found that they were off their course.

(24) For the voyage between the Butang islands and Bukit Jugra, the Arab texts are more informative than the Chinese. The former give certain sailing directions, of which some are adequate and some inadequate; they name 14 places and give the stellar altitudes at 9: the latter name 10 places, and give no further information.

(25) For the dangerous passage between the North Sands and South Sands, both Arab and Chinese texts give detailed and satisfactory directions, based on the position of Djemur and Bukit Jugra, for effecting a safe crossing: but whereas the Arabs measured the depth of water constantly, the Chinese did not measure it at all.

(26) For the voyage between Bukit Jugra and Melaka, the bearings recommended in both Arab and Chinese texts would now take the ship too far from the mainland; and no instructions are given for reaching Melaka from Tanjong Keling or from the Water islands beyong a vague direction to 'follow the land'.

(27) Beyond Melaka the quality of the Arab descriptions deteriorates suddenly; and Arab texts give no sailing instructions for the voyages from Melaka to the east side of the Karimun islands, or for the voyages through Singapore Strait, or along the east coast of the Malay Peninsula, or along the north-west coast of Borneo: on the other hand, the Chinese instructions remain just as detailed, and since on the journey from the Water islands to the Karimun islands there is no objection to a straight course on a bearing of 123°, the Chinese figure of $127\frac{1}{2}°$ may be considered satisfactory.

(28) For the passage through Singapore Strait from the Karimun islands to Pedra Branca (Horsburgh light), the Chinese sources should be accepted as substantially correct; these sources prescribe a course south of Pulau Satumu (Raffles light), and though the bearings would not be satisfactory under modern conditions, a suggested course through Keppel Harbour must be rejected as being irreconcileable with the instructions given in the Chinese sources.

(29) For the voyage along the east coast of the Malay Peninsula, some of the bearings given in the Chinese texts are satisfactory and some are unsatisfactory; certain necessary details are lacking, for instance, the bearing from Pulau Tioman to Kuala Pahang and from Pulau Kapas to Pulau Bidong Laut; but for the most part this was an easy journey in the open sea with a sufficiency of prominent land-marks.

(30) In respect of the voyage from Tanjong Datu to Pulau Balambangan, the prescribed bearings vary from good to bad; insufficient detail is given for the changes of direction from Batang Baram to the east side of Labuan island, and one bearing, $52\frac{1}{2}°$, from the east side of the Mantanani islands, would be fatal.

(31) The Arab and Chinese texts disclose the existence in Malaya and Borneo of 21 place-names not recorded in Malay classical literature, as well as the possible existence of 8 other place-names.

(32) The Arab texts provide no help towards the identification of unidentified places named in the Chinese texts; and the Chinese texts provide no help towards the identification of unidentified places named in the Arab texts.

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NOTES.

1. The books of Pires (1515) and Barbosa (1516) describe conditions in the early years of the sixteenth century; and they are frequently quoted by Meilink-Roelofsz.

2. Compare the rules adopted for British official use, *China Sea Pilot*, vol. III, 1954, pp. xv-xvi.

3. This may appear unrealistic; but the 'reasonable' course is the approximate course which Arab and Chinese navigators must actually have followed. No texts set out all the necessary bearings; the navigator was expected to keep his eye on the land-marks; the Chinese texts say "follow the mountains", and the modern 'Pilot' says "steer as necessary" — which amounts to the same thing.

4. See Tibbetts (1), p. xvii.

5. On Ahmad, see Ferrand (1), pp. 183–237, especially p. 220; Tibbetts(1), pp. 7–41, especially pp. 7–8, 15–16, 18, 23–25, 31–34, also pp. 182–183, 186, 188–189: Meilink-Roelofsz, p. 343 n. 5.

Ahmad lived from about 1437 to 1501. Tibbetts (1), pp. 9–11, takes the view that the navigator who guided da Gama to India was not the Arab, Ahmad ibn Majid, but a Muslim Gujarati.

Julfar was a port situated near the modern Khaimah (25° 48′N., 55° 57′ E.)

6. On Sulaiman, see Ferrand (1), pp. 237–248, especially pp. 240–244: Tibbetts (1), pp. 41–44. As to dates, all we know is that his *Umda* appeared in 1511 and that he had died before 1554 (Tibbetts (1), pp. 41–42.)

Shihr was situated in 14° 45′ N., 49° 34′ E., on the southern coast of Arabia.

7. See Ferrand (1), pp. 220, 240–241: Tibbetts (1), p. 500. There does not appear to be any English or French translation of Sulaiman's work, but Tibbetts gave some valuable quotations from Sulaiman regarding the west coast of the Malay Peninsula; he did not mention the east coast, and his paper did not purport to include Borneo: see Tibbetts (2), pp. 21–57.

8. Sidi Ali was a distinguished navigator, poet, and author. In 1553 he was ordered to take command of the Turkish fleet at Basra and to sail to Suez. The fleet was wrecked on the coast of Gujarat and Sidi Ali was detained at Ahmedabad, capital of Gujarat, until 1554. It was during the period of his residence at Ahmedabad that he wrote *al-Muhit*. On Sidi Ali, see Ferrand (1), pp. 248–255: Tibbetts (1), pp. 44–46.

9. English translations by J. Prinsep of certain portions were published in the *Journal of the Asiatic Society of Bengal*, 1834, 1836, 1837, and 1838. In 1897 there appeared the work of M. Bittner and W. Tomaschek entitled *Die topographischen Capitel des indischen Seespiegels Mohit;* here a German translation of certain extracts from Sidi Ali were accompanied by a series of fine maps. In 1914 G. Ferrand published his *Relations de voyages et textes géographiques arabes, persans et turks relatifs à l'Extrême-Orient des VIII^e au XVIII^e siècles*, with a section on 'Sidi Ali Celebi' (vol. II, pp. 484–541). For further details see Tibbetts (1), pp. xi-xvi.

10. An English translation of this chapter will be found in the *Journal of the*

Asiatic Society of Bengal, 1836, pp. 767–774. Ferrand (1), p. 255, considered Sidi Ali's comments to be insignificant and useless.

11. See Ferrand (2), p. 508. Chapter 4 was translated by Bittner and Tomaschek, pp. 55–76.

12. See Ferrand (2), p. 514.

13. Tibbetts (1), p. 45. Tibbetts saw European influence here.

14. An English translation of all these voyages will be found in the *Journal of the Asiatic Society of Bengal*, 1836, pp. 451–468, and a French translation of the twenty-seventh and twenty-ninth voyages in Ferrand (2), pp. 488–489, and 492–493, respectively.

15. Ferrand (2), pp. 515–540: Bittner and Tomaschek, pp. 77–91. Sidi Ali, like Ahmad and Sulaiman, wrongly orientates Java from north to south; also, he omits Calicut from his table of stellar altitudes.

16. On this map see Mills (1), pp. 236–302, especially pp. 239–241, 251, 258, 270, 279, 280, 281, 290–291 (map), 298, 299, 301, and 302. Parts of the map, together making up the whole map, were reproduced in the articles of Phillips and Mulder. The whole map has also been reproduced in Hsiang Ta.

17. Mills (1), pp. 250–251, and 295.

18. But we know that Chinese merchant ships visited Kalah (perhaps Kedah) as early as A.D. 878 (Hourani, p. 78).

19. Laud. MS Or. 145.

20. Needham vol. IV, pt. 3, p. 725.

21. *Ff.* 25v–26v, 30–30v, 32–33, 39v–45, 50v–51, 53v, and 54–54v.

22. *Ff.* 51v–53v, 58, and 60.

23. *F.* 46v.

24. For instance, in recording the bearing from Lung ya strait to Pedra Branca (Mills (1), p. 316).

25. The compilers state that they derived their information from an "ancestor"; this might mean grandfather.

26. Chinese Collection. Backhouse MS 578.

27. *Ff.* 42v, 44v, 46, 47v, and 48v.

28. *F.* 14.

29. *F.* 12v. Needham, vol. iv, pt. 3, Plate CDXVI reproduces this table.

30. *F.* 5.

31. *F.* 5. See Needham, vol. iv, pt. 3, p. 564.

32. *Ff.* 5 to 8.

33. *Ff.* 14v–18. For instance, when it is stated (*ff.* 15v and 16) that the bearing from one place to another is *ch'ou kuei* [30°–15°], reading the characters anti-clockwise, and that the bearing in the reverse direction is *ting wei* [195°–210°], reading the characters clockwise, it necessarily follows that the points intended are 22½° and 202½° [being 22½° added to 180°]: this disproves the hypothesis that '30°–15°' meant 20° and that '195°–210°' meant 205°; *cf. T'oung Pao*, vol. XXXVII, livr. 1 (1942), pp. 1–14, especially p. 5.

34. *Ff.* 36v, 37–37v, 43, 45v, 49, 50–51v.

35. *F.* 32.

36. But another part of the work contains a reference to the Moluccas (*f.* 31v).

37. For instance, it states (*f.* 51v) that the navigator sails from Saja islets to Lingga island on a bearing of 202½° [actually 7°].

38. Pp. 120–121.

39. P. 122.

40. P. 124.

41. Kelantan is mentioned merely as a place visited on the way from Grande Condore to Pattani (p. 120).

42. P. 120.

43. Pp. 118 and 124.

44. P. 120.

45. P. 121.

46. Hourani, p. 11.

47. Hourani, p. 33.

48. Needham, vol. I, p. 179.

49. Tibbetts (3), pp. 31–32.

50. Tibbetts (3), p. 37: Wheatley, p. 210.

51. Wolters (1), p. 39.

52. It is not certain when the Arabs first arrived, but it must have been some time before 758 (Wang Gungwu, p. 75 n. 19).

53. Tibbetts (3), p. 37.

54. Wang Gungwu, p. 75. The Arabs soon advanced further north, to Yang Chou on the Ch'ang Chiang [Yangtze], and even to Korea (Tibbetts (3), pp. 28, 37). Presumably they proceeded to China by the main route of the time, that is, by way of the Nicobar islands to Kedah, thence to Palembang, and thence to Kuang Chou [Canton] (Tibbetts (3), p. 3: Wang Gungwu, p. 103: Wheatley, pp. 43–45).

55. Wang Gungwu, p. 79.

56. Tibbetts (3), p. 27.

57. Hourani, p. 77. The main route of the Arabs sailing to China now by-passed Palembang, and ran from Kedah through Singapore Strait to Pulau Tioman (Hourani, p. 71). Hourani (p. 73) says that the Arabs followed the same route on the return journey, whereas Chia Tan, writing about 800, describes the main route to the west as running from Singapore Strait along the east and north coasts of Sumatra (Wang Gungwu, p. 105).

58. Hourani, p. 77.

59. Hourani, p. 78. The location of Kalah is uncertain: Sauvaget (whom we follow) favoured Kedah: Wheatley preferred Mergui: and Coedès says 'Malay Peninsula to the north of the isthmus of Kra' (Wheatley, p. 224: Coedès, p. 242: Wolters (2), p. 163).

60. Tibbetts (3), p. 31: Wang Gungwu, p. 88.

61. Hourani, p. 83. In the twelfth century the Arabs had a monopoly of the freight and passenger business; but this monopoly was wrested from them by the Chinese (Lo (1), p. 499). However, by about 1400 the Chinese had ceased to carry on direct trade with India (Schrieke, pt. I, p. 25).

62. Tibbetts (2), pp. 38, 44, where the sea-rovers are called "strange savages", and identified with the Proto-Malay *orang laut*: Tibbetts (3), pp. 14, 37: Wheatley, p. 212 (map), and p. 232, where the sea-rovers are called "aborigines". It may be noted that (a) the maritime activity of the ancient Arabs was restricted to commerce and piracy (Hourani, p. 55), and (b) the states of southern Arabia never established a permanent navy.

The principal Arabian ports connected with the Far Eastern trade were (proceeding from west to east) Jidda (21°29′N.), Aden (44°59′E.), Shihr (49°34′E.), Risut (54°01′E.), Muscat (23°37′N.), and Suhar (24°21′N.). (Hourani pp. 70, 78–79).

The Arab merchants established semi-permanent settlements in several, if not many, ports of the Malay Archipelago; for instance, at Palembang and Brunei, and perhaps at Lamuri (Lambri) in Sumatra and Leran in Java, as well as at Kalah in the Malay Peninsula (Tibbetts (3), pp. 36, 38–41, 44; Meilink-Roelofsz, p. 164).

63. Ferrand (1), vol. III, p. 89.

64. Wang Gungwu, p. 14.

65. Wang Gungwu, pp. 38–39.

66. Wang Gungwu, pp. 58–59. The Yüeh people (fundamentally Indonesians) occupied the territory now called Chê Chiang (Chekiang); with their 'sinization' in the third century B.C. the 'Chinese' people now included a sea-faring group (Wang Gungwu, p. 4). During the centuries, there was considerable maritime activity in 'home' waters, including naval warfare with the people of Nan Yüeh, Tung Ching, and Lin I or Lam Ap, later called Champa (Wang Gungwu, p. 14: Le Thanh Khoi, p. 117: Hall, p. 34). Some writers have thought it probable that Chinese ships during the fifth century travelled, not only to Ceylon, but to Aden and the Persian Gulf; see Needham, vol. I, p. 179 and Hourani, p. 38.

67. Hirth and Rockhill, p. 8: Wang Gungwu, pp. 65–66: Wheatley, pp. 26–36: Coedès, p. 100: Wolters (2), pp. 161, 173, 203. The location of Ch'ih t'u is much disputed: we here adopt the view of Moens and Coedès.

68. Kuwabara, no. II, p. 70. Buddhist pilgrims normally used these foreign ships: by way of exception, I Ching travelled in a Persian ship (Wang Gungwu, p. 103).

69. But improvements were being made in ship-construction; and by about 730 iron fastenings were normal (Needham, vol. IV, pt. 3, p. 459 n.h.).

70. Wang Gungwu, p. 107.

71. Wang Gungwu, pp. 104–105: Wheatley, pp. 47–60: Wolters (2), pp. 187–190.

72. Wang Gungwu, p. 107: Reischauer, p. 156.

73. Hourani, p. 18: Schrieke, pt. II, pp. 231–232: Wheatley, pp. 216–224: Coedès, p. 242: Wolters (2), p. 163. The Arab trading ships resorted to China again at the beginning of the tenth century (Wang Gungwu, p. 88), and by about 950 most of the Arabs who came to China preferred to travel in the stronger and safer Chinese ships (Kuwabara, no. II, p. 66); but the Persians ceased trading to China, apparently defeated by Arab and Indian competitors (Hadi Hassan, pp. 115, 146).

74. Lo (1), pp. 489, 491: Needham, vol. IV, pt. 3, p. 476.

75. Hirth and Rockhill, pp. 89, and 91 n. 13: Lo (1), p. 499.

76. Lo (1), p. 491.

77. Le Thanh Khoi, p. 181: Reischauer and Fairbank, pp. 280–281: Needham, vol. IV, pt. 3, p. 477. Khubilai's navy staged the largest overseas expeditions which the world had yet seen; but his invasions of Japan, Champa, Tung Ching, Liu Ch'iu (Ryu-kyu), and Java all ended in failure (Latourette (1), pp. 264–266: Reischauer and Fairbank, pp. 539–540). In Yüan times Chinese merchants began to take up residence in the 'South Seas'; thus, in 1350 a group of Ch'üan Chou traders was resident in Pan-tsu, Fort Canning Hill (Wheatley, p. 83).

78. Ferrand (2), vol. II, p. 350.

79. Schrieke, pt. II, p. 232.

80. Latourette (1), p. 267: Latham, p. 273.

81. On these expeditions see Mills (1), pp. 8–19. The Chinese established a depot at Melaka (Wheatley, p. 324). The Sultan of Melaka was accorded especial favours by the Emperor of China; in particular, he was presented with ceremonial robes bearing the pattern of the five-clawed dragon (*lung*) as contrasted with robes bearing the pattern of the four-clawed dragon (*mang;* Giles, no. 7671), normally bestowed on vassal rulers (Cammann, p. 194).

82. Lo (2), p. 151. Needham (vol. IV, pt. 3, p. 484) thought that Chêng Ho's navy would have outmatched that of any contemporary European state. Chinese merchant ships occasionally visited ports in the Red Sea, e.g. Aidhab in 1422 (Crawford, p. 122) and Jidda in 1431 and 1432 (Greenlee, p. 83). Trade followed the flag, and presumably the volume of China's trade reached a new high point under the Yung Lê emperor (Reischauer and Fairbank, p. 323). On the other hand, in some spheres there was retrenchment; for instance, Chinese ships did not normally sail to India after about 1400 (Schrieke, pt. I, p. 25).

83. Mills (1), pp. 14–21.

84. Lo (2), pp. 157–162.

85. Fairbank and Têng, pp. 201–202: Lo (2), pp. 156–157: Reischauer and Fairbank, p. 336.

86. Latourette (2), p. 282: Lo (2), p. 156. But in the Indian Ocean the Arabs remained the leading traders and mariners (Hourani, p. 83).

87. Wolters (2), p. 322 n. 23. In 607 Fu-shih-pu-lo, 'Vijayapura', somewhere in western Borneo, was apparently the chief kingdom lying east of the Malay Peninsula (Wolters (2), p. 175).

88. Wolters (2), p. 175: Pelliot (1), p. 287 n. 2. The oldest mention of the name 'P'o-ni' appears in Fan Cho's *Man Shu*, published about 860 (Pelliot (1), p. 132 n. 5).

89. Wolters (1), p. 189.

89a. Groeneveldt, p. 230: Hirth and Rockhill, pp. 157 and 159 n. 13: Tibbetts (3), pp. 30–31, 43. This was the first tribute embassy from Brunei to China.

90. Hirth and Rockhill, pp. 18–19.

91. Groeneveldt, p. 231: Coedès, p. 291.

92. Hirth and Rockhill, p. 155. An important and wealthy sultanate was developing; the ruler controlled 14 districts and the town of Brunei contained 10,000 inhabitants. Members of the royal family might use plates of gold. Camphor was an important product. Chao Ju-Kua (1226) describes the mode of trading and specifies the trade goods. (Hirth and Rockhill, pp. 156, 158).

93. Rockhill, pt. II, pp. 261, 264, 266. Tanjong Pura lay on the Pawan river, at or near the modern Matan; it was 'a sort of capital among the Bornean places'. Wang Ta-Yüan enumerates the local products, which included camphor from Brunei and gold dust from Tanjong Pura (Rockhill, pt. II, pp. 265, 266). In 1365 Majapahit exercised a certain authority over these Bornean ports, and by 1500 the place of Majapahit had apparently been taken by Japara (Meilink-Roelofsz, p. 101).

94. Groeneveldt, p. 231·

95. *Ming Shih*, p. 7913, row 3. According to Pelliot, in Ming times (1368–1644) P'o-ni was a state on the west coast of Borneo, and P'o-lo, exact location unascertained, on the north coast of Borneo (Pelliot (2), p. 267 n. 346).

96. According to the *Ming Shih*, the dates of the embassies from China were 1405, 1408, and 1411 (p. 7917, row 3); and the dates of the embassies from Brunei were:—

1405 and 1406 (p. 7917, row 3)	1415 (p. 7918, row 1)
1408 (p. 7917, rows 3 and 4)	1416 and 1417 (p. 7107, row 2)
1410 (p. 7106, row 3)	1421 (p. 7107, row 3)
1412 (p. 7106, row 4)	1425 (p. 7109, row 1)

Fairbank and Têng (p. 151), quoting the *Ming Hui Tien* of 1587, record an embassy from Brunei in 1414; but this is not mentioned in the *Ming Shih*, either in 'basic annals' (*pên chi*) on p. 7107, row 1, or in the account of Brunei on p. 7918, row 1. Some of the above dates may be found in Groeneveldt, pp. 223, 232–234.

Li Hsien's *Ta Ming I T'ung Chih* (c. 1450), ch. 90, contains an account of P'o-ni (*f.* 16) and of P'o-lo (*f.* 21v). In 1408 the Chinese emperor commanded Java not to demand tribute from Brunei (Groeneveldt, p. 233).

97. Rockhill, pt. II, p. 262, quoting Fei Hsin, for Gelam island. Rockhill does not translate Fei Hsin's account of P'o-ni; it may be found in Fêng Ch'êng-Chün's *Hsing Ch'a Shêng Lan Chiao Chu*, II, p. 14.

98. Meilink-Roelofsz, pp. 50, 84, 85, 100, 101, 164. The Bornean products, especially diamonds, gold. Camphor, and foodstuffs were important to Melaka (Meilink-Roelofsz, pp. 101, 164). Lawe is identified by Meilink-Roelofsz (p. 349 n. 205) with a river in south-east Borneo: one suggests that it is more likely to be the Lo-wei of 'Shun Fêng, (*f.* 42v) which gives sailing instructions for the voyage from Wu Hsü, near Hsia Mên (Amoy), *viâ* Pulau Tioman to Lo-wei; this place was situated on the west coast of Borneo, south of 0°48′N. and north of Sukadana (1°10′S.). We provisionally identify it with Pontianak (0°01′ S.). Some support for this identification is provided by the statement of Eredia (1597–1600) that "Sucadana and Laue are two abundant Rivers in the Southern country of Borneo, wherein large quantities of Precious Stones are found" (Mills (3), p. 245).

99. Tibbetts (1), p. 48.

100. Tibbetts (1), p. 48: Hourani, pp. 91–94.

101. Tibbetts (1), p. 49: Hourani, p. 89.

102. Tibbetts (1), p. 52: Hourani, p. 100.

103. Needham vol. IV, pt. 3, pp. 480–482: Mills (1), pp. 304–305. Chêng. Ho's 'treasure ships' were said to be 449 feet long: some modern writers incline to reduce this to 300 feet, the maximum length for a safe wooden ship (Gibson, p. 145).

A note by the present writer, originally intended as a basis for discussion, was, owing to a misunderstanding, printed in the *Mariner's Mirror*, vol. 46, no. 2 (1960), pp. 147–148.

104. Needham, vol. IV, pt. 3, pp. 399–402: Mills (1), p. 305. Iron fastenings were already normal in the eighth century (Needham, vol. IV, pt. 3, p. 459 n.h.)

105. Needham, vol. IV, pt. 3, pp. 480–481: Mills (1), p. 305.

106. Mills (1), p. 305. Larger ships might have 8 masts (Needham, vol. IV, pt. 3, p. 481).

107. Hourani, p. 101: Tibbetts (1), p. 52.

108. Needham, vol. IV, pt. 3, p. 595. For handiness the Chinese rig is unsurpassed (Needham, vol. IV, pt. 3, p. 598).

109. Arab *rahmani* recorded the latitude of every port and headland, and contained tables. Chinese charts might also include navigational instructions (Hourani, p. 107: Tibbetts (1), pp. 45, 321: Needham, vol. IV, pt. 3, pp. 564, 568 n.j, 569 n.b: *cf.* Mills (1) on the Mao K'un map, pp. 236–302.

110. Tibbetts (1), pp. 294–297, with figure on p. 297.

111. Ferrand (1), pp. 44 n. 1 and 58 n. 1.

112. Tibbetts (1), p. 315.

113. Tibbetts (1), pp. 312–315.

114. There were different types of *khashaba* (Tibbetts (1), pp. 317–321). For the method of using the instrument see Needham, vol. IV, pt. 3, p. 574. For other instruments, including the *kamal*, see Tibbetts (1), pp. 313–319.

115. Tibbetts (1), p. 331.

116. Tibbetts (1), pp. 337, 339. For the other stars see Tibbetts (1), pp. 324–354.

117. Tibbetts (1), pp. 339–340.

118. Tibbetts (1), p. 321. Ahmad maintained that if there was only a single bright star in the heavens he could always ascertain the latitude (Tibbetts (1), p. 325).

119. Tibbetts (1), p. 315, says that "most of the Pole Star altitudes for places were inherited over the ages"; but Ahmad insists that his own measurements ought to be accurate (Tibbetts (1), p. 322).

120. Needham, vol. IV, pt. 3, pp. 570, 575.

121. Needham, vol. IV, pt. 3, p. 574. In the fifteenth century the Chinese navigators were using a set of 12 standard ebony tablets (Needham, vol. IV, pt. 3, pp. 574–575). Sidi Ali had a system of 9 tablets, as used by "the ancients" (Tibbetts (1), p. 316). For some time the Portuguese used the Arab *kamal*, a single tablet with a knotted string running through the centre (Needham, vol. IV, pt. 3, p. 574).

122. Needham, vol. IV, pt. 3, pp. 567, 571, 583. This, of course, was a source of inaccuracy, since the difference (in 1965) between the declination of Polaris (89°06′) and 50 of Cassiopeia (72°15′) is 16°51′ and not 11°12′ (seven times 1°36′). Chinese texts do not mention the relation between Hua kai and Ursa Major (Pei tou, 'The northern bushel').

123. For the identification of Hua kai, the writer is indebted to Dr. G. T. Bath, Research Fellow of Merton College, Oxford.

For the other stars and their identification see Needham, vol. IV, pt. 3, pp. 565–567 and Plate CDXVI: Mills (1), pp. 307, 335–346: Tibbetts (4), pp. 97–108.

The 'Ping Ch'ien' (*f.*12v) contains a register of 9 stars, and the stellar diagrams of Mao Yüan-I's *Wu Pei Chih* mention 6 other stars, making 15 different stars in all.

124. "Observations with the early instruments could be made reasonably accurately on land, but hardly at all at sea" (Needham, vol. IV, pt. 3, p. 557 n.k.)

125. Tibbetts (1), pp. 62–63. The Arab texts do not mention any mechanical device for measuring time (G. R. Tibbetts, private communication).

126. Tibbetts (1), pp. 272, 299.

127. Needham, vol. IV, pt. 3, p. 570. A sand clock was made in 1370, and Chêng Ho's large ships may have carried one (Needham, vol. IV, pt. 3, p. 569).

128. Tibbetts (1), pp. 299-300.

129. Tibbetts (1), p. 354.

130. Tibbetts (1), p. 307. The basic mistake was the fallacy that the longest side of a right-angled triangle was equal in length to the sum of the two shorter sides (Tibbetts (1), p. 301).

131. Tibbetts (1), pp. 358, 359, 360.

132. Tibbetts (1), p. 355: Tibbetts (5), p. 16.

133. Needham, vol. IV, pt. 3, p. 564 n.e. The Ming *li* was 0.348 statute mile, and the length of 1° of latitude on the equator is 68.71 statute miles.

134. Hourani, pp. 110–112. If it is correct to presume with Tibbetts (1), p. 299, that 12.05 sea-miles would be, roughly, the distance sailed in 3 hours, the speed would be, roughly, 4 knots. It is also possible to calculate speed by measuring the actual distance between the several places mentioned by Sulaiman (Tibbetts (1), pp. 358–360); for instance, if the *zam* is taken as equivalent to 3 hours' sailing, then the speed of a ship sailing 75 miles from Pulau Pinang to Pulau Perak in 8 *zam* or 24 hours is 3.1 knots.

135. Mills (1), p. 308.

136. Needham, vol. IV, pt. 3, p. 564 n.e., considered that a speed of 8 to 10 knots would be quite reasonable for Chêng Ho's ships.

137. Tibbetts (1), p. 276: Mills (1), p. 306.

138. Tibbetts (1), p. 360: Wheatley, pp. xviii-xx. In Malaysian waters the monsoons are, of course, the north-east and south-west monsoons. But ships could work 'against' the monsoon; thus, sailing directions are given for a voyage to the south-east (from Thailand to Sarawak) and then north-east (along the north-west coast of Borneo): *cf.* 'Shun Fêng', *ff.* 51v–52.

139. Tibbetts (5), p. 6: Tibbetts (1), pp. 290 *et sqq.*: *cf.* Taylor, p. 128.

140. Tibbetts (5), pp. 6, 22: Tibbetts (1), pp. 312 *et sqq.*

141. Tibbetts (1), pp. 278 *et sqq.* In Melaka Strait, when crossing between North and South Sands, the Arabs took the depth 'constantly'. The use of the plumb-line was also of vital importance for European sailors in the shallow waters of north-west Europe; *cf.* Taylor, p. 131.

142. Tibbetts (5), p. 19. Hence the importance of knowing the latitude of important places: *cf.* the tables in Tibbetts (1), pp. 358–360, and in Ferrand (2), pp. 515–539.

143. Hourani, p. 109: Tibbetts (1), p. 57: Needham, vol. IV, pt. 3, pp. 593–594, with a diagram showing the principles of 'tacking' and 'wearing'.

144. From 'Shun Fêng', combining the instructions given for 4 voyages, namely, from Kuang Tung to Melaka (*ff.* 25–26), from Melaka to Kuala Pasai (*f.* 45), from Kuala Pasai to Calicut (*ff.* 46v–47), and from Calicut to Hormuz (*ff.* 47v–48), we get instructions for the whole voyage from China to Iran (Persia). (a) Compass-bearings are recorded in 59 instances; (b) stellar altitudes are recorded in 9 instances, namely, Polaris 4 times, Crux 3 times, and 50 Cassiopeia twice, but in only 3 instances can the measurements be considered to have been taken in order to ascertain latitude, the measurement in the other 6 instances being noted merely by way of comment; (c) depths are recorded in 4 instances; the Chinese did not measure the depth of the water during the dangerous passage between the North and South Sands; on the other hand, they thrice took a sounding in the vicinity of Pai chiao, Pedra Branca ('Shun Fêng', *f.* 32), and they might take a sounding in mid-ocean, as when approaching Grande Condore (Lü P'an *f.* 50v).

145. Needham, vol. IV, pt. 3, p. 594. By changing direction in mid-ocean, as on the voyage from Deogarh in India to Jabal Quraiyat in Arabia ('Shun Fêng', *f.* 47v), the Chinese indicated that they thought they knew their longitude.

146. Poujade, p. 243 n.1: *cf.* Needham, vol. IV pt. 3, pp. 593–594.

147. We have written '8½' fingers for convenience; the Arab text gives '1½' fingers as the altitude of Polaris (Tibbetts (1), p. 188).

148. Tibbetts (1), pp. 186, 188, 483–484. We ignore Pulau Perak because it is too remote, and we ignore Pulau Tanburak, alleged to lie west of Pulau Pinang, because it does not exist; *cf.* Tibbetts (1), p. 484.

149. See Tibbetts (2), pp. 48–53: Wheatley, pp. 234–240: Tibbetts (1), p. 188: Ferrand (2), pp. 540–541.

150. But we know that Chinese ships were visiting 'Kalah', not further south than Kedah, as early as the year 879; *cf.* Hourani, p. 18, and Wheatley, pp. 222–224.

151. Tibbetts (1), pp. 483–484; *cf.* Mills (3), pp. 122–123.

152. The distance from 'Keda' to Pulau Pinang was 4 *zam* (about 48 miles) and the distance from Kuala Kedah to Pulau Pinang is 40 miles, whereas the distance from Kuala Merbok to Pulau Pinang is only 14 miles: *cf.* Tibbetts (1), p. 186: Mills (2), pp. 12–15.

The identification of places named in the Mao K'un map is dealt with in greater detail in Mills (2), pp. 1–48.

153. The name appears under the heading 'Mien hua' ('cotton') islands in the geographical notes of 'Shun Fêng' (*f.* 14v): we have not met with the name elsewhere.

154. Mills (2), pp. 15–18: Tibbetts (1), pp. 484–485.

155. The figure of 6¾ fingers is given by Sidi Ali (Ferrand (2), p. 533).

156. Tibbetts (2), p. 52.

157. Tibbetts (2), p. 52. Sulaiman's other accounts may be found in Tibbetts (2), pp. 48–52.

158. Ahmad's account may be found in Tibbetts (1), p. 188. The various accounts do not altogether tally.

159. 'Shun Fêng', *f.* 45 v.

160. Mao K'un map, *ff.* 16–16v: Mills (1), pp. 286–287.

161. 'Shun Fêng', *f.* 45.

162. Shipwrecks were not infrequent in this dangerous passage; but the phlegmatic Chinese do not even warn the navigator to be careful.

163. See note 149.

164. 'Pilot', No. 44, p. 175.

165. Wheatley, p. 236 n. 3.

166. Wheatley, p. 236.

167. See Tibbetts (1), pp. 483–485, 494: Tibbetts (2), pp. 48–57: Wheatley, pp. 234–243: Mills (1), p. 285: Mills (2), pp. 16–18.

168. Tibbetts (1), pp. 188–189.

169. Tibbetts (2), p. 48.

170. Tibbetts (2), p. 49.

171. Tibbetts (2), p. 52.

172. Tibbetts (2), p. 49.

173. Tibbetts, (2), p. 52.

174. Mao K'un map, *ff.* 16–16v.

175. 'Shun Fêng', *f.* 26.

176. 'Shun Fêng', *f.* 32v.

177. 'Shun Fêng', *f.* 45v.

178. 'Shun Fêng', *f.* 53v.

179. Lü P'an, *f.* 50.

180. 'Shun Fêng', *f.* 26.

181. 'Shun Fêng', *ff.* 32–32v.

182. 'Shun Fêng', *f.* 45.

183. 'Shun Fêng', *ff.* 54–54v.

184. Lü P'an, *f.* 50.

185. Chang Hsieh, p. 121.

186. Tibbetts (1), p. 485.

187. Illustrating the general rule that the radical difference between 'western' and 'eastern' geographical documents lies in the fact that the former become less detailed and accurate as they proceed eastward, and the latter as they proceed westward.

188. Tibbetts (1), p. 485.

189. The name appears, without any description, between Bukit Jugra and Cape Rachado in the geographical notes of 'Shun Fêng', *f.* 14. We have not met the name elsewhere.

190. Tibbetts (1), p. 485.

191. Melaka was called Five Islands because, as Ma Huan stated, "the sea had five islands", namely, the Water islands (Mills (1), p. 108).

192. Tibbetts (1), pp. 188–189.

193. Herein lies a curious story. As stated above, Chang Hsieh wrote "a chief established a market on these [islands]" (*ch'iu k'ai chên yü tz'ŭ*); Phillips misread the first two characters as "*Yiu mên*", and noted " a large trading place by the name of *Yiu-men* was on one of these islands"; since when, for nearly a century, historical geographers have vainly searched for this "geographical phantom" called "Yiu-mên" (Chiang Hsieh, p. 121: Phillips, XXI, p. 38: Duyvendak, pp. 42–43).

194. 'Pilot', No. 44, p. 184: Mills (2), pp. 19–20.
195. 'Pilot', No. 44, p. 188: Mills (2), pp. 20–21.
196. Mao K'un map, *ff.* 15–15v.
197. 'Shun Fêng', *ff.* 26–26v.
198. 'Shun Fêng', *f.* 32v.
199. 'Shun Fêng', *ff.* 50v–51.
200. Lü P'an, *ff.* 50–50v.
201. 'Shun Fêng', *f.* 14.
202. 'Shun Fêng', *ff.* 25v–26.
203. 'Shun Fêng', *f.* 32.
204. 'Shun Fêng', *f.* 50v.
205. Instead of writing *pan ch'uang* (Giles, no. 8602, 2778), perhaps the author intended to write *pan chuang* (Giles, no. 8602, 2756), 'partly visible'.
206. Lü P'an, *f.* 50.
207. Chang Hsieh, pp. 120–121.
208. If they were making for Keppel Harbour, they would have to steer 75°, that is, north of due east.
209. 'Pilot', No. 44, p. 194.
210. In order to avoid the shoals off Tanjong Pagar, it would be essential to make this turn to the south-east (see Gibson-Hill (1), pp. 180–181, 190; Gibson-Hill (2), pp. 59–61): yet, may it be emphasized, it was precisely this turn which the Chinese texts instructed the navigator not to make. The course through Keppel Harbour has always been unpopular with navigators; even after the improvements made from 1863 onwards, both sailing craft and coasting steamers preferred to travel round to the bay off the Singapore river (Tregonnig, p. 276).
211. *F.* 15v.
212. Mills (1), pp. 327–328.
213. Gibson-Hill (2), p. 59.
214. Mills (1), p. 327.
215. Mills (2), Plate II, facing p. 21: Wheatley, Fig. 20, facing p. 100: Mills (1), p. 313.
216. We need not attach any weight to the fact that Ch'ang yao island means 'Long waist' island, since several islands in this region were called 'Ch'ang yao' island by the Chinese.
217. There is no merit in the suggestion that 'Dragon teeth' referred to vertical rocks at the western entrance of Keppel Harbour: *cf.* Braddell, pp. 19–21: Gibson-Hill (2), p. 37 n. 58: Mills (1), pp. 317–318. The conclusions of Gibson-Hill, based on probabilities, possibilities, disputed facts, and suggestions (for instance, that the text of the Mao K'un map was 'doctored') do not require further consideration.
218. See 'Pilot', No. 44, p. 427. View (35).
219. Lü P'an *f.* 51.
220. Since all the Chinese texts contain errors, a commentator is justified in rejecting particular statements if other evidence so requires. But what evidence, one must ask, requires the rejection of the assertion, expressed or implied in 8 statements by 4 authors, to the effect that Chinese ships on reaching the Karimun islands changed

to a more southerly course [towards Pulau Satumu] and not to a more northerly course [towards Keppel Harbour]?

The present writer greatly regrets his inability to follow the reconstruction of Professor Wheatley and Professor Hsü Yün-Ts'iao, who favour the identification of Lung ya strait with Keppel Harbour. Compare Wheatley, pp. 91–103, with Figure 20 (the Mao K'un map) and Figure 21 (reconstruction), and Hsü Yün-Ts'iao, p. 3.

Those who identify Lung ya strait with Keppel Harbour must seek to identify Sha t'ang shoals, Liang san island, and Niu shih rock with places on the south side of the fairway through Keppel Harbour.

221. Ferrand (2), p. 500: Ferrand (1), p. 172.

222. Ferrand (2), p. 527.

223. Tibbetts (1), pp. 182, 183, 487.

224. Mao K'un map, *ff.* 14v–15.

225. 'Shun Fêng', *f.* 14.

226. 'Shun Fêng', *f.* 17.

227. 'Shun Fêng', *f.* 23v.

228. 'Shun Fêng', *f.* 24v.

229. 'Shun Fêng', *ff.* 24v–25.

230. 'Shun Fêng', *f.* 25v.

231. 'Shun Fêng', *f.* 26v.

232. 'Shun Fêng', *f.* 30.

233. 'Shun Fêng', *f.* 30v.

234. 'Shun Fêng', *f.* 32.

235. 'Shun Fêng', *f.* 33v.

236. 'Shun Fêng', *f.* 34.

237. 'Shun Fêng', *f.* 39v.

238. 'Shun Fêng', *f.* 42.

239. 'Shun Fêng', *f.* 50v.

240. Lü P'an *f.* 36v.

241. Lü P'an, *f.* 37.

242. Lü P'an, *f.* 43.

243. Lü P'an, *f.* 46v.

244. Lü P'an, *f.* 50.

245. Lü P'an, *f.* 50v.

246. Lü P'an, *f.* 51.

247. Lü P'an, *f.* 51v.

248. Chang Hsieh, p. 120.

249. These small changes of course show that the Chinese (a) took great care to adopt the correct bearings, and (b) thought that they knew their longitude.

250. Text (28) says 5 watches; but this is too little; in the opposite direction the voyage might take 15 watches, as in text (11).

251. In Professor Wheatley's reproduction (Wheatley, p. 96) the first character is *t'u*, 'earth': certainly 'earth round' seems a more likely name for an island than 'scholar round'.

252. Tibbetts (1), pp. 486–487.

253. Professor Wheatley re-examined these names in 1961 (Wheatley, p. 96); and where his conclusions agree with the identifications suggested in this paper, no further explanations are necessary.

254. On the one hand, it might be thought that Huo shao mountain would be Pulau Sibu, because Huo shao mountain is the most often mentioned and Pulau Sibu is the highest hill, being 503 feet high. On the other hand, it might be thought that Huo shao mountain and Chu mu might be Pulau Lima Besar (172 feet) and Pulau Lima Kechil (174 feet), because these islands are connected with each other, as stated in text (3). We have suggested the latter alternative, because (a) these islands lie only about 5 miles from the 'reasonable' track of a ship proceeding northward from Pedra Branca to the east side of Pulau Tinggi, whereas Pulau Sibu lies about 10 miles away, and (b) in text (17) navigators are warned to be careful when passing the 'Hat Band' and the Lima islands are a nearer danger than Pulau Sibu.

255. 'Pilot', No. 30, p. 127.

256. Mao K'un map, *ff.* 12v–13.

257. 'Shun Fêng', *ff.* 51v–52.

258. 'Shun Fêng', *f.* 52v.

259. 'Shun Fêng, *f.* 53.

260. 'Shun Fêng', *ff.* 53–53v.

261. 'Shun Fêng', *f.* 58. *Lao-ku* rock was a kind of coralline rock; the term *lao-ku* is well-known to the Chinese, but it represents some foreign words, as yet unexplained: *cf.* Rockhill, pt. II, p. 111 n. 1: Mills (1), p. 157 n.9.

262. 'Shun Fêng', *f.* 60.

263. Lü P'an, *ff.* 32–32v.

264. Chang Hsieh, p. 124.

265. Fairbank and Têng, pp. 221–222: Pelliot (2), p. 267 n. 346: Li Hsien, *ff.* 16, 21 v.

266. 'Shun Fêng', *f.* 40v.

267. Mao K'un map, *f.* 13: *cf.* Mills (1), p. 280.

268. 'Shun Fêng', *f.* 53.

269. 'Pilot', No. 31, p. 376, view 12. *Cf.* Chart 2107.

270. 'Shun Fêng', *f.* 52.

271. The Chinese name *lo-po*, 'turnip', suggests that Balabac is a Malayo-Polynesian word, etymologically connected with the Malay *lobak*, now meaning the Chinese radish.

272. 'Shun Fêng', *ff.* 58–58v.

273. Tibbetts (1), pp. 188–189, 485.

274. 'Pilot', No. 44, p. 178.

275. 'Pilot', No. 44, p. 180.

276. Mills (3), p. 205.

277. de Jong, p. 64 (inset map).

278. Mills (2), Plate III, facing p. 29: Wheatley, Fig. 20, facing p. 100: *cf.* 'Pilot', No. 30, pp. 151–153, and Chart 2414.

279. See 'Pilot', No. 30, pp. 141–142, 147, and Chart 3543.

280. de Jong, pp. 61–70 (with map on p. 64)

281. The name 'Pan Kura' represents the name 'Pangkor', but the place Pan Kura was Bukit Segari (False Dindings).

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ARAB AND CHINESE NAMES

(See Tables I, II, IV, VI, VIII, X)

Arabic letters			Chinese characters
بتنج	*1*	*(1)*	古力由不洞
لكاوى	*2*	*(2)*	龍牙交椅
كيدا	*3*		
		(3)	吉達港
فلو فتنج	*4*	*(4)*	栎榔嶼
كرا	*5*		
وان كورة	*6*		
دنج دنج	*7*		
فلو سنبيلن ملاقة	*8*	*(5)*	九州
تنبورك	*9*	*(6)*	陳公嶼
سالنج	*10*		
بلنج سالنج	*11*		
		(7)	吉那大山
فلو هنسا	*12*		
		(8)	吉那五嶼
كلنج	*13*		
		(9)	吉令港
فلو باسلار	*14*	*(10)*	綿花嶼
فلو جمر	*15*	*(11)*	雞骨嶼
قفاصى	*16*	*(12)*	綿花淺
فلو باسلار	*17*	*(13)*	綿花嶼

سنيا اوسنج	18		
		(14)	文魯古
مدور	19	(15)	假五嶼
ابى	20		
ملاقة	21	(16)	滿剌加
فلو ملعقة	22		
سبتا	23		
		(17)	五嶼
		(18)	射箭山
فيسنك	24	(19)	昆宋嶼
		(20)	平洲
كريمن	25	(21)	吉利門
		(22)	淡馬錫門
		(23)	沙糖渓
		(24)	長腰嶼
		(25)	龍牙門
		(26)	凉傘嶼
		(27)	牛屎礁
		(28)	琵琶嶼
		(29)	官嶼
		(30)	琶撓嶼
سنجافورا	26	(31)	淡馬錫
كالنج	27		
		(32)	答那渓嶼
		(33)	烏丁礁林
		(34)	羅漢嶼
		(35)	白礁
		(36)	馬鞍山
		(37)	緬丹
		(38)	海山
		(39)	火燒山
		(40)	猪母

تنك	28	(41)	將軍帽
		(42)	東西竺山
		(43)	石礁
		(44)	失力山
		(45)	苧麻山
فانج فاتك	29	(46)	彭杭港
		(47)	鐵砧嶼
		(48)	打造船山
		(49)	斗嶼
		(50)	綿花嶼
		(51)	丁加路
		(52)	角員
		(53)	士員嶼
		(54)	羊嶼
		(55)	石山
		(56)	三角嶼
		(57)	烟墩嶼
كلاندن	30	(58)	吉蘭丹港
		(59)	東蛇龍山
		(60)	單戎嘮梅
		(61)	赤土白面山
		(62)	淡水港口
برانى	31		
		(63)	勃泥
		(64)	文萊
		(65)	毛花蠟
		(66)	鯉魚嶼
		(67)	長腰嶼
		(68)	長腰嶼港口
		(69)	峴崙山
		(70)	聖山
		(71)	五嶼
		(72)	屎角山
		(73)	蘿蔔山